Early Islamic Glass in the Western Indian Ocean: a typological and functional analysis of the archaeological assemblages from Kadhima & Mughaira (Kuwait) and Unguja Ukuu (Zanzibar)

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Andrew Blair

This thesis explores the typological attributes and functional role of vessel glass in the Persian Gulf and East Africa during the late 1st millennium AD. The thesis aims to improve understanding of the typological components of the Early Islamic vessel glass tradition; to assess the function of this material in different site contexts; and to exploit glass as a proxy for studying trade and the Indian Ocean 'world'. The main data for this research consists of two previously unstudied glass assemblages, one from the Zanzibari town of Unguja Ukuu, the other from several related sites in Kuwait.

The original contributions made by this thesis can be found in both its methodology and in its results. In addition to introducing a large quantity of new data, this thesis has also designed a new typology for Early Islamic vessel glass. This work has identified a narrow range of types which represent the core components of the Early Islamic glass tradition, as well as challenged the 'art historical' perspective on the subject. The analysis of function represents the first such study on this scale, and has demonstrated the different roles played by glass in a variety of functional and socio-economic contexts. It is suggested that vessel glass was employed to fulfil a wide range of domestic needs in the Kuwaiti sites. The Unguja Ukuu assemblage appears to have been dominated by vessel forms suitable for eating, drinking and display, leading to the suggestion that possession and use of glass was an important means through which coastal communities differentiated themselves from those of the interior. The thesis has argued that the sheer size of the Indian Ocean glass trade would have created a shared material landscape. However, differences in the way glass was understood limit the extent of unity within any Indian Ocean 'world'.

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Andrew Blair

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Chapter One
Introduction

1.1. Thesis Outline

This thesis explores the typological attributes and functional role of vessel glass at a number of sites in the vicinity of the Persian Gulf and East African coast, as seen through a comparative analysis of previously unstudied archaeological assemblages. Its geographical focus has been chosen partly in response to the relative dearth of analyses which have addressed material from these regions compared to the central Islamic world. In addition, its spatio-temporal remit represents an acknowledgement of the increase in cultural and economic interaction between the Persian Gulf and East Africa which followed the near simultaneous emergence of the Umayyad then Abbasid caliphates and the socio-economically mature towns of the proto-Swahili coast. To bring these developments into chronological focus, the thesis concentrates on the later part of the 1st millennium, specifically the 7th to 10th centuries AD.

Much of the original research undertaken within this thesis is based on two previously unstudied glass assemblages. One is from the Zanzibari town of Unguja Ukuu (Fig. 1.1), excavated during 2010-13 by a team from Oxford University. The other is compiled from several contemporary sites located in the modern state of Kuwait (Fig. 1.1), excavated by a team from Durham University and the National Museum of Kuwait between 2009-15. The selection of these sites was partly opportunistic, exploiting the most current and best excavated material available. Selection was also driven by the fact that the assemblages in question are broadly contemporary and composed of very similar material - presumably of a common origin - yet represent vastly different geographic, cultural and socio-economic use contexts. They also, for different reasons, represent gaps in current knowledge. As such, in combination the glass assemblages from these sites offer a golden opportunity to explore how different factors influenced patterns of consumption. Where possible, the materials from Kuwait and Unguja Ukuu are supplemented by a discussion of published glass assemblages from other sites within the respective regions. However, the major inspiration for this thesis lies in the fact that few similar analyses have been undertaken. While this limits the comparative scope of the research, this is more than mitigated by the pioneering contributions that this thesis is able to make. The thesis is organised around three main aims. These are:

- To improve recognition of the typological components of the Early Islamic vessel glass tradition, specifically from an archaeological point-of-view;
- To assess the practical and social function of such vessel glass in material life at different sites in the western Indian Ocean;
- To examine the potential contribution that studying archaeological glass assemblages can make to current understanding of the nature of the Indian Ocean 'trade' and the development of an Indian Ocean 'world'.

The intention of the remainder of Chapter One is to review the current state of knowledge pertaining to these issues. The focus is on elucidating the key gaps in knowledge which justify, indeed require, the thesis's exploration of the above aims. Chapter Two proceeds to discuss the above aims and objectives in more detail, before establishing a methodological framework through which these might be met. The next three chapters present the data and analysis, beginning in Chapter Three with a substantial typology of the diagnostic material from the Kuwaiti sites and that of Unguja Ukuu. Not only is this typology of integral importance to the analysis conducted within this thesis, but by organising and structuring the glassware according to a formal methodology this chapter also represents a large contribution to knowledge in its own right. As such, Chapter Three should prove of unrivalled value to scholars of Early Islamic glass. Chapters Four and Five offer in-depth studies of the glass according to their site context, exploring the quantity and function of the assemblages along with their contribution to site interpretation. Chapter Six presents a discussion of the main results and the wider significance of the research, structured around an evaluation of the extent to which the aforementioned aims have been met. Chapter Seven concludes the main text of the thesis by reviewing its contents and results, evaluating its successes and failures, and offering some thoughts on future studies that might prove fruitful avenues of research. Some supplementary information is contained in Appendices A-C (Volume II). Appendices A and B present extensive descriptions of the Kuwait and Unguja Ukuu excavations respectively, including the contextual information drawn from the site records and preliminary reports. The intention is that the reader can focus on the main text of the thesis while able to consult the background data with ease. That said, the site descriptions contained in the main text are enough to give a useful understanding of the relevant contexts. Appendix C, included on the accompanying disc, contains the glass databases for the respective sites in digital format.

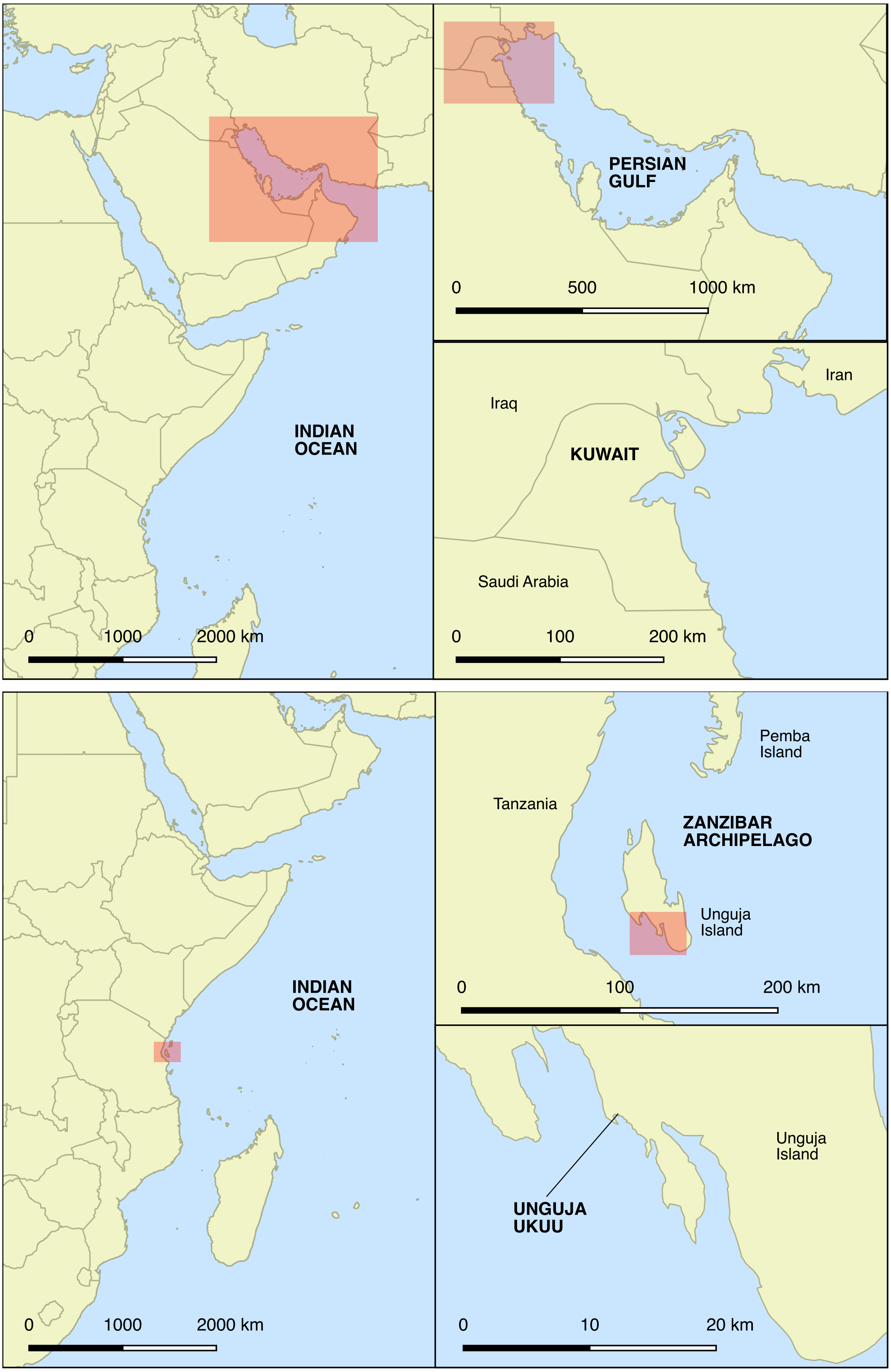


FIG 1.1. THE STUDY AREAS - KUWAIT AND UNGUJA UKUU

Before continuing with the main part of Chapter One, it is worth stating a few areas into which this thesis does not intend to stray. First, this thesis entails a study purely of Early Islamic vessel glass, and as such does not include other artefact groups produced in the same medium whether bodily adornments or architectural features. The rationale behind this is that these represent very different artefact categories to vessel glass, entailing a different production and consumption pattern and thus requiring their own bespoke methodology for study. Second, this thesis does not attempt a comprehensive synthesis of all finds of Early Islamic glassware. While this would be a valuable endeavour, and was indeed considered as a possible avenue of research, it was considered that the aforementioned aims explored by this thesis could make a bigger contribution to knowledge than what would essentially amount to an extensive literature review. That said, a summary of the distribution of glass in the Indian Ocean region is included below (§1.2.3).

Third, the typology offered by the thesis is based purely on the new assemblages addressed within; that is, those from Kuwait and that from Unguja Ukuu. The rationale behind this is that there is more than enough material to be dealt with within the confines of a single thesis. In addition, there are plenty of obstacles which restrict the value of published assemblages; particularly in terms of the quality of the line drawings and descriptions upon which the typology must rely, the lack of complete data, and the fact that much of the material is poorly dated and understood. In fact, as this thesis aims to achieve a better standard of recognition as to the typological components of the Early Islamic glass tradition, there is a strong argument for confining this initial stage of research to the new assemblages where it is possible to work without any preconceptions and within a closely defined chronological range. That said, an extensive search of the published literature was conducted with the aim of identifying parallel examples of the types defined within this thesis. It should be noted, however, that, owing to the geographic location of the sites in question, the typology produced is most relevant to the 'Indian Ocean' leaning side of the Early Islamic world rather than, for example, the eastern Mediterranean.

Finally, this thesis does not include any scientific analysis of the chemical composition of the vessel glass from Kuwait or Unguja Ukuu. This analysis is beyond the scope of the thesis. Early attempts to arrange analysis within Durham University were curtailed by a lack of facilities. In the event this has been a positive development in that it has allowed for greater attention to the structuring and organisation of the typology, which in turn will now allow for much better targeted analysis of well defined and increasingly well dated rim and metal types.

1.2. Picking Holes in Early Islamic Glass Studies

The following subsections commence the main part of the thesis by exploring the existing literature pertaining to the Early Islamic glass tradition. The intention here is to identify the key gaps or weaknesses around which the thesis can structure its aims and methodology (see Chapter Two). The main topics of discussion include the origins of the tradition, as well as what can be said regarding production, distribution and consumption. It becomes evident that while the basic facts relevant to the production methods and distribution of Early Islamic glassware are relatively well understood, a more in depth understanding of the typological components of the tradition is lacking. Particularly troubling gaps in knowledge concern the specific vessel types which comprise the Early Islamic glass tradition, their role and importance to those communities which used them, and the wider importance of such glass to the Indian Ocean trade and the related development of what has been called the Indian Ocean 'world'. It will be seen that almost nothing has been written on the subject of usage or 'consumption'. This is staggering, not merely because of the importance of this topic, but also in light of the plethora of literature on 'consumption studies' which have become widely dispersed throughout the archaeological discourse in the last few decades. This thesis does not intend to become deeply embroiled in the theory of consumption itself, merely to identify how paying some overdue attention to this topic could pay dividends in regard to Early Islamic glass studies. The section thus concludes with a discussion of the problems facing the discipline, and thereby provides the framework for the formulation of aims and objectives as dealt with in Chapter Two.

1.2.1. Origins

The origins of the Early Islamic glass tradition extend back more than 3500 years, given that glass working as a deliberate craft began in Mesopotamia, c. 1500 BC, spreading to Egypt within 100 years (see Nicholson 1993; Lilyquist & Brill 1993; Shortland 2000; Shortland 2005; Shortland 2012). The first glass vessels were core-formed or moulded, with both techniques seen in early examples at Tell Atchana in Northern Syria (Woolley 1955; Shortland 2012: 47-8). Their main components were silica from quartzite pebbles (Tite & Bimson 1986; Shortland 2000; Tite & Shortland 2009: 61), soda from the ash of salt-tolerant plants of the genus *Salicornia* or *Salsola*

(Brill 1970a), lime via the addition of limestone or shell (Shortland 2012: 103), and colourants such as copper or cobalt. The 14th-13th centuries BC represented the high point of this early production, and the following two centuries saw diminished quantities (and qualities) with an increased amount of recycling of old material (Shortland 2012: 169; Keller 1983; Pusch & Rehren 2007: 144).

Space constraints do not allow the luxury of following every detail in the evolution of the early glass traditions, however a number of technological innovations are worth indicating owing to their subsequent significance. One such innovation is a change in chemical composition which occurred in some glass houses c. 800 BC, with lower magnesium levels indicating the replacement of plant ash with mineral soda (Henderson 2000: 26; Sayre & Smith 1967: 285, 287). The use of mineral soda or natron is characteristic of the Roman glass produced in the eastern Mediterranean, by which time beach sand was the main source of silica if Pliny and Agricola are to be believed (Turner 1956; Tait 1991; Degryse & Schneider 2008; Shortland 2012: 99). A second important innovation involved a change in working techniques, particularly the invention of glass blowing in the Levant in the mid-1st century BC. Hellenistic and Early Roman glass vessels were cast, moulded and 'sagged' - time consuming processes not dissimilar to those employed by the first Mesopotamian and Egyptian glass workers. These techniques ensured that glass remained a relatively expensive commodity, retaining a prestigious position confined to upper-class and religious contexts. The invention of glass blowing was to revolutionise the industry, and by the middle of the 1st century AD glass had become, within the Roman Empire at least, a commodity that was cheaply available and widely consumed (Prior 2015). Not only did glass blowing vastly reduce the time (and thus cost) involved, it also increased the range of forms that could be produced.

At this point it is worth considering the evolution of the glass industry outside of the Near East. Glass spread east with the Roman Empire to India, as the large quantities of Roman glass found at Early Historic emporia such as Pattanam and Arikamedu attest (Shajan *et al.* 2008; Cherian *et al.* 2009; Wheeler *et al.* 1946; Stern 1991; Tomber 2007, 2008; Cobb 2015: 196). Meanwhile, contemporary glass traditions thrived in the Parthian and Central Asian worlds, coexisting with and sometimes subsumed within the Roman tradition. Vessel glass was also being regularly produced in China from the Han period with textual sources suggesting Saltpetre was used as the fluxing agent (Borrell 2010), though earlier primitive glass bead and inlay traditions seem to extend back to the Western Zhou and Spring and Autumn periods (Gan 2009:

9). Chinese material was produced at Guangxi in southern China, Guangzho in modern Guanxi, Guangdong, and at Jiaozhou in Vietnam (An 2002). Chinese glass was also traded far overseas, as demonstrated by a glass bowl found at Arikamedu (Wheeler et al. 1946; Borell 2010: 129-31).

In the Near East, in the centuries immediately preceding the Islamic period one can crudely divide the existing glass traditions into the Byzantine and the Sasanian - thus following the received geo-political division of the region. The Byzantine tradition, dominant in the eastern Mediterranean, displays strong continuity with its predecessor in stylistic, technological and compositional terms (Keller *et al*. 2014). Sasanian glass, characteristic of the region east of the Euphrates into Iran, also exhibits a high degree of Roman influence, along with the continuation of Parthian and Central Asian stylistic legacies and its own, original traits (see Simpson 2014). Sasanian glass is comparatively understudied, with this tradition often squeezed awkwardly between those of the Romano-Parthian and Early Islamic periods (Simpson 2005; Whitehouse 2005). That said, it contains some important distinctions between itself and Roman/ Byzantine glass. Most important in terms of understanding the character of the Early Islamic glass tradition is the continued use of plant ash as a fluxing agent, in contrast to the use of mineral soda in the eastern Mediterranean following its adoption c. 800 BC, as noted above. Stylistically, the Sasanian tradition is most recognisable through its particularly elaborate cut and facet-cut decoration, a technique that seems to have had a later influence on glass decoration later in the Islamic period.

FIG 1.2. GLASS PRODUCTION ZONES OF THE 'ISLAMIC' WORLD

1.2.2. Production

Together these earlier glass traditions represent the formative period for many of the distinctive characteristics which later came to define the Early Islamic glass industry. Defining this industry is, however, easier said than done. In spite of a long history of research (and not unreasonable quantity of data), the state of research on Early Islamic glassware has been described previously as ‘chaotic’ (Whitehouse 2000: 2-3). It is indicative of this situation that since the publication of Lamm’s seminal study of Early Islamic glass based on his work at Samarra (Lamm 1928, 1930), few scholars have managed to advance our understanding of complex issues of dating and provenance. Indeed, there is an enduring absence of an explicit and accepted account of what the Early Islamic glass tradition actually consists of. Here, Early Islamic glass loosely refers to material produced within the area under the nominal influence or control of the Umayyad and Abbasid caliphates. As definitions go, this one is somewhat vague, and as such this thesis will try to address some of these issues in the following sub-sections, starting with production.

Although crude, it is possible to define three major production zones from which slightly distinct traditions of glass originated in the Early Islamic period (Fig. 2): Egypt and the Levant, Mesopotamia and southwest Iran, and Central Asia (Henderson *et al.* 2016: 138). Broadly speaking, these follow the pre-existing glass traditions outlined above, the Byzantine, the Sasanian and the Central Asian. The glass production centres of the Egyptian and Levantine zone are perhaps the best known, with documented production traces (whether in the form of furnaces and kilns, tanks and wasters) found, by way of example, at Fustat, Tyre, Raqqa, Bet She’arim and Bet Eli’ezer (Shindo 2000: 233; Scanlon 1965, 1967, 1981; Henderson 1995, 1996, 1999; Freestone & Gorin-Rosen 1999: 105). In Central Asia, although this region is less well explored, contemporary glass production is evident at Akhsiket and Kuva in Uzbekistan, among other places (Rehren *et al.* 2010: 97-99). In Mesopotamia and southwest Iran, traces of glass production are scarce, though production is said to have occurred in Baghdad and Samarra, while Basra too is historically-attested as such a source (Lamm 1930: 498; Ettinghausen *et al.* 1987: 72; Northedge & Faulkner 1987). In reality, it is likely that primary glass production was highly decentralised, having taken place at most major population centres, and was a regular feature of the industrial complex. However, the evidence can be difficult to recognise - particularly where subsequent settlement has obliterated the archaeological landscape.

The evidence which does survive reveals a distinction between the production of raw glass and glass 'working' (Nenna 2000; Gorin-Rosen 2000). Raw glass was produced in slab form at a number of sites in the Levant, as the tank furnaces at Bet She'arim and Bet Eli'ezer demonstrate (Freestone & Gorin-Rosen 1999: 105; Gorin-Rosen 1994: 42-3). The glass slabs would then be broken up into ingots, and subsequently worked into vessels or transported elsewhere for later working. Production seems to have occurred in the same localities as other furnace-dependent industries, as seen at Hitra, Iraq (Rousset 1994), and often facilities were shared with potters (Foy 2011). The 11th century AD industrial complex at Sabra al-Mansuriyya exemplifies this level of integration. Of four furnaces studied by Foy (2011), one was used for the production of raw glass (with evidence for the inclusion of recycled material), two were used for glass working, while the fourth was primarily associated with pottery production but was also used for *la recuisson* of glass on occasion. The production of unworked raw glass ingots and the gathering of broken glass (cullet) for recycling are both apparent at Sabra al-Mansuriyya, but are almost always invisible aspects of the glass production industry.

Two sites particularly important for understanding the nature of glass production and working are Raqqa and Tyre. The northern Syrian town of Raqqa, a large urban centre inhabited from the Hellenistic period, was thrust to the forefront of Early Islamic industrial and artistic production when it was adopted as the summer residence of the caliph Harun al-Rashid at the very end of the 8th century AD (Henderson & McLoughlin 2003; Heidemann 2006). The extensive industrial zone has produced extensive evidence of glass (and indeed ceramic) production facilities dating to the late 8th and early 9th centuries AD, particularly the four 'beehive' type furnaces identified in the Tell Zujaj area of the site (Henderson & McLoughlin 2003: 144). Later furnace and glass working areas were also identified at Tell Fukhkhar (11th century AD) and Tell Belor (11th to 12th centuries AD). Analysis by Henderson and others has isolated a compositional signature of glass produced at Raqqa, particularly using trace element analysis, which fits within a broader regional north Syrian/Levantine group (Henderson & McLoughlin 2003; Henderson *et al.* 2016). Indeed, the nature of glass production at Raqqa at this time has been interpreted as evidence of innovation and experimentation related to the adoption of plant ash as a flux (Henderson 2002; Henderson *et al.* 2004; Henderson & McLoughlin 2003: 145; Henderson 2013: 260), a transformation which characterises the development of Islamic glass in the late 8th to early 9th century, as discussed below.

The city of Tyre, situated in southern Lebanon on the eastern Mediterranean, also reveals a number of early Medieval glass-making furnaces and waste, including small glass chunks and parts of large glass slabs (Aldsworth *et al.* 2002). The four furnaces include surviving traces of loading platforms, firing and melting chambers, with the tanks some 6 x 4 metres in extent (Aldsworth *et al.* 2002: 51-53). It is thought, based partly on ethnographic evidence, that the furnaces would have had to operate for as many as 30 days at 900 degrees celsius to achieve a suitable melt (Aldsworth *et al.* 2002: 63). This would have required large amounts of fuel and ongoing attention from the operatives. Indeed, two firing chambers seem to have been used simultaneously for each furnace, allowing one to be cleaned out and relit while the other continued to burn (Aldsworth *et al.* 2002: 63). While raw glass, in slab form, was made in a variety of colours (including natural green, colourless, purple and blue) and is found scattered widely across the surrounding area, there is no evidence of secondary production, that is, vessel working, anywhere in the vicinity (Aldsworth *et al.* 2002: 64-65). As such, Tyre seems to confirm the separation of production and working in the Early Islamic glass industry. One interesting point relates to the sheer quantity of raw glass that each furnace could produce from one firing. The authors estimate that each of the furnaces for which measurements are available would have produced 37 tonnes, 16 tonnes and 13 tonnes respectively, with 37 tonnes corresponding to 250,000 finished vessels of 150 g weight (Aldsworth *et al.* 2002: 66).

The chemical composition of glass can also offer a window onto production practices. Although recycling and trade have an obfuscatory effect, distinct compositional groups can be associated with each of the main production areas, particularly in the Umayyad and early Abbasid periods. Egypto-Levantine glass produced during the 7th-8th centuries AD exhibits compositional continuity with the preceding Romano-Byzantine industries, with low potassium and magnesium oxides indicating continued exploitation of mineral soda or (natron) as a flux (Freestone *et al.* 2006; Henderson 2013: 260). In contrast, Iraqi glass continued the Sasanian method of using plant ash as a flux, as indicated by higher potassium oxide and magnesium oxide levels (Freestone *et al.* 2006; Mirti *et al.* 2008). Central Asian glass is again distinct, probably exploiting plant ashes again but with high alumina levels and instances of Potash glass (Brill 2001: 33-43; Vahidzadeh & Afrund 2010; Rehren *et al.* 2010: 97-99). Indeed, recent compositional studies are demonstrating with ever increasing clarity the decentralised nature of primary and secondary production of glass across the Early Islamic world (Henderson *et al.* 2016). Using major, minor and particularly trace element analyses of plant ash glasses, the authors identified both regional and sub-regional glass groups in

Iraq, Iran, northern Syria and the Levant with a level of clarity far beyond expectations indicating narrow and decentralised production spheres (Henderson *et al.* 2016).

Indeed, it is compositional data which reveals one of the defining features of the maturing Early Islamic glass tradition. In the course of the early to mid-9th century, Egypto-Levantine glass producers began to substitute mineral soda (natron) for plant ash, thus abandoning an important part of the Romano-Byzantine legacy in favour of a recipe much closer to that long-since employed in Iraq and southwest Iran (Henderson 2002; Henderson *et al.* 2004; Henderson & McLoughlin 2003). Some have sought to explain this transition as a response to problems in the natron supply chain (Freestone & Gorin-Rosen 1999: 116; Freestone et al. 2006), while Henderson highlights the apparent decline in patronage of glass production in the Umayyad period as a related factor (Henderson 2013: 260). The alternative use of plant ash as a flux must have been well known to the Egypto-Levantine glass producers, especially following the political unification of the two regions some centuries before. Yet that did not mean that the transition was plain sailing, as a failed experimental glass slab at Bet She'arim attests (Freestone & Gorin-Rosen 1999: 105).

This pattern whereby regional continuity was followed by increasingly centralised standardisation also manifests itself in a stylistic sense. The survival of certain Romano-Byzantine forms and influences have been identified in Egypto-Levantine glass, as for example at Fustat, Pella and Borsa (Scanlon & Pinder-Wilson 2001; O'Hea 2003; Dussart 2007; Shindo 2009; Foy 2000), as well as that from the central Islamic lands (Ettinghausen *et al.* 1987: 72). Henderson demonstrates that the influence of Byzantine artisans continued through the Umayyad into the Abbasid periods, not least due to the continuation of diplomatic ties but also because the artisans themselves were highly coveted and moved around over hundreds of kilometres (Henderson 2013: 254-256). Carboni states that even at Samarra, perhaps the most important site in what he calls the 'formative period for Islamic art', there was a 'curious revival of Roman techniques and ornamental styles' such as the brief renaissance of the millefiori technique (Carboni 2003: 127; 2001: 15-17). According to Ralph Pinder-Wilson (1991), Sasanian glass also had stylistic influences on Early Islamic glass workers, particularly in the continuation of certain styles of wheel-cutting and with some vessel forms influenced by Sasanian metalwork, such as with the Persian Glass ewers. Others have gone further, arguing that Sasanian cut glass represents a link between the cut glass of the Roman world and the Islamic period, though this link 'remains to be demonstrated' (Carboni 2001: 17; Whitehouse 2005: x).

Perhaps the birth of a uniquely Islamic glass tradition is best seen in the emergence of several distinct decorative techniques which emerge throughout this period, such as those of lustre staining (Carboni 2001: 51-3), scratch-engraving (Hadad 2000; Carboni 2001: 71-3; Carboni & Whitehouse 2001; Kroger 2005; Whitehouse 2010), relief-cutting (Henderson 2013: 257), as well as the presence of vessels inscribed with blessings in the Kufic script (Carboni & Whitehouse 2001: 164-5). Although rare components of the tradition as a whole, it is often the case that the most unusual and unique pieces define an artistic tradition, not least due to their dominance in museum and private collections. In regards to the more mundane aspects of Early Islamic glassware, there remains a large degree of continuity between both earlier and later periods. Much of the material is simple in form and its metal somewhat plain and undecorated, making it particularly difficult to assign a precise date with any degree of reliability. As such, decorative pieces aside, much of the work in defining the components of the Early Islamic glass tradition remains to be conducted. It is a shame that it is relatively easy to recognise a unique 'stand out' piece as showing Early Islamic traits while the more mundane but regularly used vessels of the day remain unrecognised.

By way of summary, it is worth reiterating that the Early Islamic glass tradition is characterised by an increasing standardisation of composition and style from a regionally-fragmented starting point, only reaching maturity by the 9th century AD. It is interesting to note that a similar delay between the foundation of a political and even socio-economic Islamic world and its manifestation in material culture is also seen in other forms of artistic production. In ceramics, for example, the dominance of blue-green Turquoise Glazed wares into the late 8th and early 9th century AD represents the continuation of a material tradition with its roots in the Parthian period. It is only after the consolidation of the Abbasid empire and the construction of a new capital at Samarra that a distinctly 'Islamic' ceramic style emerges (Carboni 2001: 15). This is seen in the emergence of the so-called Samarra Horizon wares, for example, polychrome splash wares, in the first half of the 9th century AD (Kennet 2004: 38). While individual developments such as this have their own unique explanations (for example, the ceramic developments are undoubtedly a reflection of the influence of Chinese ceramic traditions seeping into the Islamic world as a result of an intensification of the Indian Ocean trade), there is one underlying factor which all the material traditions seemed to share - the desire for new fashions fit for a new world. As more of the citizenry began to identify with a socio-cultural, religious and political hegemony that had taken several centuries to embed itself, it is easy to see the appeal of a distinctly 'Islamic' style in a newly Islamic world striving to legitimise and differentiate itself.

1.2.3. Distribution

From its production centres Early Islamic glass was moved around extensively via the local networks which held together the Islamic world. It also travelled much further afield. It is hard, on the basis of present knowledge of settlement patterns and material assemblages, to say anything concrete regarding the potential changes in the extent of glass distribution within the heartland of the Islamic world which occurred during the Early Islamic period. Indeed such a study would undoubtedly prove fruitful. However it seems that, albeit anecdotally speaking, the distribution of glass expanded as the number of small-scale settlements increased in the 7th and 8th centuries AD. There is evidence that substantial quantities of vessel glass were present at locally-oriented sites lower down on the economic scale - of which some of the Kuwaiti settlements explored later in this thesis are a prime example - as opposed to being confined to more economically developed settlements. The quantity of glass at smaller sites, and particularly the integral role that it played in material life therein, seems to represent a departure from the situation in earlier periods; though confirmation of this point would require a more rigorous analysis of the earlier data. What is becoming clear, however, is that the Early Islamic period sees an increase in the wider distribution of vessel glass across the Indian Ocean region and beyond, both in terms of distance, quantity, and perhaps even value (Stargardt 2014: 37).

Within the western Indian Ocean, this increase in distribution is evidenced clearly in the large quantities of Early Islamic glass which have been (and are continuing to be) discovered right along the East African coast from the 7th or 8th century AD. Substantial assemblages of imported vessel glass have been found at proto-Urban and Urban sites along the 'Swahili' coast as far south as Mozambique and Madagascar. The best known assemblages are from the Kenyan sites of Manda and Shanga (Morrison 1984; Horton 1996b), with partially-published material from Kilwa (Chittick 1974), Kisimani Mafia (Morrison 1987), Tumbe (Fleisher & LaViolette 2013), Chibuene (Sinclair et al. 2013; Wood et al. 2013; Wood 2012), Dembini and Sima (Wright 1984; Allibert et al 1989). Very brief references to glass are made at Mogadishu (Chittick 1982: 60), Kiwangwa (Chami & Msemwa 1997: 675) and Mtapwa (Dussubieux & Kusimba 2012), while unpublished assemblages are known from Fukuchani, Mahilaka, Pango La Ukunju. Indeed this thesis introduces yet another major East African assemblage through its study of the material from Unguja Ukuu, thus offering a Zanzibari perspective.

A particularly interesting feature of the distribution of Islamic vessel glass in East Africa is not so much its sheer extent, but how to explain certain gaps. Few examples of glass are known from late 1st millennium AD sites on the southern Somali coast. This is probably a good example of an absence of evidence rather than evidence of absence, a long period of civil war being a major factor here. More interesting is the near total lack of vessel glass, or indeed any imported material culture, at inland sites, with imported material almost exclusively confined to a narrow coastal strip of no more than a few kilometres. The only inland site which seems to have had any glass in this period may be the site of Misasa I: K1, located near Mkiu in southeast Tanzania (Fawcett & LaViolette 1990: 21). Yet here there is just a small handful of fragments, and the site is not more than 20 km from the coast so hardly can be considered part of the East African 'interior'. Altogether, the almost total absence of imported glass (or other material) in the East African interior is in contrast to the coastal and inland distribution of local material culture.

Further afield, significant quantities of Early Islamic glass have been recorded in the Far East and Southeast Asia, particularly as deposits in religious and elite funerary contexts. In China, Islamic glass has been found in temples at Famen (Jiang Jie 2010), Qinqshan, Jingzhi, and Huiguang Pagoda (Moore 1998; Xiaomeng 2010). Moore demonstrates the esteem in which foreign glass was held in China, noting its frequent appearance in Tang-period Buddhist iconography such as the Dunhuang cave murals (Moore 1998). An Jiayao discusses a number of vessels imported from the Islamic world to Guangzhou (Canton) during the Tang and Five Dynasties period, found in palatial and mortuary contexts (An Jiayao 2010). Islamic glass is also found widely throughout Southeast Asia, particularly from the 9th century AD in Thailand (Bronson 1996), Vietnam (Shindo 2000), Sumatra (Guillot & Wibisono 1998) and Korea (Insook Lee 2010). While Sasanian glass is also known from this region, it is found in much smaller numbers and may represent a less direct exchange network much of which could have proceeded overland. As discussed below, the growth in direct maritime trade between China and the Islamic world was a feature of the Early Islamic period, and glass seems to have been one of the commodities most highly sought from the Islamic world. Direct evidence of the maritime route of Islamic glass to the Far East and Southeast Asia can be found in the 10th century AD Intan and Cirebon shipwrecks (Stargardt 2014: 44). Although in the 8th and 9th centuries AD direct journeys between

China and the Middle East were common, by the 10th century AD the journey was more commonly broken up into regional spheres. These Southeast Asian ships appear to have taken on their cargo somewhere in the eastern Indian Ocean, with as much as 10% of the cargo of the Cirebon wreck estimated as consisting of glass, the remaining bulk made up of Chinese ceramics and iron (Stargardt 2014: 45; Liebner 2006).

Glass from the central Islamic lands also travelled to the far west. Trans-Saharan trade routes brought glass and other items of material culture, as well as the Islamic religion, to West Africa, as 9th-12th century AD assemblages from Gao, Mali show (Insoll 1998). A fragment from the Gao assemblage offers an appropriate way to conclude this sub-section, revealing as it does the sheer extent of the global distribution of Islamic glassware. This fragment, produced in blue glass, exhibits a distinctive scratch-engraved decoration dated from the 9th century AD and which has been identified commonly in Iraq, Iran and the Levant. Fragments of scratch-engraved glass, often blue in colour, made it to places such as Manda and Unguja Ukuu in East Africa (Morrison 1984: 183; for Unguja Ukuu, *this thesis*), the Greek city of Corinth (Davidson 1952: 88, no. 748), and possibly Malaya in Southeast Asia (Meyer 1996: 249). Yet this is a type also prized much further afield. In China, examples of blue plates with similar scratch engraved designs were considered precious items worthy of a place in the most opulent of offerings, such as that sealed in the Famen temple crypt in AD 874 (An Jiayao 1991: 123-4, figs. 3-8; Jiang Jie 2010: 185-86, pls. 1-6). Even as the crow flies, this is a distribution which ranges over 10,000 km.

1.2.4. Consumption

The issue of consumption, or how any given object was acquired, understood and ultimately utilised within a given historical and socio-economic context (Dietler 2010: 209; Mullins 2011), is considered within a wealth of historical, anthropological and archaeological literature. Yet it remains among the most neglected questions in modern glass studies, particularly in the Middle East and Indian Ocean region. Studies of consumption in archaeology emerged in the 1970s, particularly in anthropology, sociology and the other social sciences, perhaps following the mass-consumer boom of the mid-20th century (Dietler 2010: 209, 212). While archaeologists' constant engagement with material culture and other physical remains ensures the discipline has always engaged with consumption on a certain level, a more theoretical approach to consumption seems to have entered archaeological thought via the anthropological door in the 1980s - particularly following the universal impact of efforts such as Appadurai's *The Social Life of Things* (Appadurai 1989).

In a review of the place of consumption studies in archaeology, Paul Mullins has contrasted the traditional, narrow definition of consumption prevalent within archaeological research - whereby a given object or class of objects is tied to predetermined ideas surrounding social-status, ethnicity, gender and presumably practical function - with a more conceptual interpretation examining ‘how people socialise material goods’; in other words how the acquisition of things is used to construct and contest collective and self identity (Mullins 2011: 134-5). As Mullins is concerned with promoting a more conceptual agenda, he is somewhat forced to stress the dichotomy between these two versions of consumption. While he raises a valid point, in a practical sense it is not always possible to limit oneself to the more conceptual interpretative approach which he promotes. The nature of archaeological evidence, and the paltry quantity of work which has come before, requires sacrifices on a theoretical level. A more pragmatic strategy is called for, whereby reflection on the agency of object, individual and community is grounded within a more traditional interpretative framework that considers the social and symbolic role of material goods alongside their functional and economic role.

In contrast to the relative plethora of scientific analyses and works concerned with production and distribution, there are few examples of consumption-led glass studies. Frankly, there are almost no examples of such studies on the subject of Islamic glass, and very few of any merit further afield. One such contribution is found in Hugh Willmott’s PhD thesis (Willmott 1999), in which he offers a study of patterns of consumption in relation to Tudor and early Stuart vessel glass. Willmott attempts to define the main typological components of the Tudor and Stuart glass traditions before considering their consumption at a range of urban and rural settlements based on a combination of archaeological and historical research. A greater quantity and quality of archaeological and historical data allows Willmott to go into details that one can only dream of reaching within an Indian Ocean context. Nevertheless, this thesis attempts to make a start over the course of the next five chapters.

As an indication of the difficulties to be faced, it is worth contrasting Willmott’s in-depth and informed analysis with Daniel Keller’s valiant but limited treatment of the glass from Kush (Keller 2010). By considering the proportion of vessel types and assigning them functional roles informed by an understanding of local historical context, Keller is able to demonstrate the changing use of glass at Kush from the Sasanian through Early Islamic periods. His efforts demonstrate what even a brief consideration of consumption might achieve, though his work is undoubtedly limited by the small numbers of vessels involved and a lack of comparable studies. In light of the small number of consumption studies, gaining a better understanding of how Islamic glass was used in the late 1st millennium AD must certainly be a priority for future research.

1.2.5. Issues and Obstacles

The above overview of the existing literature has seen three issues come to the forefront. The first is the ongoing uncertainty as to the typological components which make up or 'define' the Early Islamic glass tradition. Second is the failure to consider the various functional and social roles played by Early Islamic glass in different sites and contexts. Third is the limited level of understanding as to the importance of glass in the Indian Ocean trade networks more generally, and its contribution to untangling the development of a late 1st millennium AD Indian Ocean 'world'. It is these three issues which this thesis is determined to address. As such, it is worth bringing into focus a number of the most significant obstacles which have previously hindered the answering of these questions.

One problem is in the quantity and quality of published research available for study. Although glass is one of the most abundant finds in the Indian Ocean region during the later 1st millennium AD, it has been consistently undervalued as an archaeological resource. More than thirty years ago James de Vere Allen made a throwaway yet probing remark that, on the subject of glassware in the Indian Ocean, a "massive recapitulation of the evidence…might produce vast additions to our existing knowledge, or might produce nothing" (Allen 1980: 145). In the intervening years, such a recapitulation has remained conspicuous in its absence. Furthermore, there has been little advance in standards of publication of vessel glass, with most studies limited to summary catalogues with brief speculations as to date and provenance and little in the way of contextual analysis. Nor is the necessary data made available in published form for others to make use of. Thus the discipline is faced with a limited quantity of low quality data with which to work.

Another issue is the dominance of the 'art historical' perspective. The 'Art-historical' perspective is here defined as a tendency to focus on the aesthetic and stylistic attributes of a given vessel over and above consideration of their use, function and, most importantly, their archaeological context (Ettinghausen et al. 1987). Furthermore, in the 'art-historical' perspective the object is seen as the end-point of the analysis, rather than as a starting point from which one might explore broader archaeological (particularly socio-economic) questions. In Pottery in Archaeology (2013), Orton and Hughes summarise the history of ceramic studies into three theoretical phases: the ‘art historical’, the ‘typological’, and the ‘contextual’. I would argue that glass studies, particularly in the Islamic world, is struggling to progress beyond the ‘art historical’ phase. This perspective is clearly dominant in the treatment of museum and private collections, perhaps not unreasonably so (e.g. Carboni 2001; Carboni & Whitehouse 2001; Whitehouse 2010). The issue is that as these publications are disproportionately well funded and professionally produced compared to their archaeological equivalents, much of what is written and thought to be known about Islamic glass relies on this hand-picked, exceptional material rather than on more authentic archaeological assemblages.

Art historical treatments of glass do of course have an important role in the archaeological study of this material, and indeed explore an interesting set of questions in their own right. However I would like to highlight three main issues which this thesis has the opportunity to address. The first is the potential misrepresentation of what the glass tradition actually consists of in the main. Although this is in no way a deliberate intention of the authors of art historical-type glass studies, it is frequently an unintended effect. Consider the nascent student of Early Islamic glass, for example, in turning to the most expansive and neatly polished publications, generally forms their first impressions of the tradition based on a small number of highly decorated, elaborately worked and fanciful vessel forms designed for a small elite.A second issue is that the tendency to focus on the object in isolation, whether from other objects or from its archaeological contexts of use and discovery, has left the discipline of Islamic glass studies somewhat the poorer in terms of the socio-economic understanding of the basic material than is the case with, for example, ceramic vessels.

Finally, there is the issue of value. Although it is not entirely responsible, the art historical approach has contributed to the belief (held by the uninitiated at least) that glass is a purely high-value or luxury commodity. Again this is a function of the fact that the better quality sources on glass are focussed disproportionately on museum and private collections. Some glass specialists have sought to dispel this myth, with Stefano Carboni pointing out on several occasions that most Islamic glass was probably perceived as low in value. Carboni states in his *Glass from Islamic Lands* that, even in a highly selective assemblage such as the al-Sabah collection, as much as 60-70% of the glass is undecorated (Carboni 2001: 139). The question of value is an area of glass studies that is particularly unexplored. Analyses of archaeological assemblages have a lot to contribute in this regard, particularly by quantifying the prevalence of decoration (and other 'special' attributes) and further exploring the use context of vessels. It is important to bear in mind, however, that the issue is not so clear cut. Indeed, the fact that glass vessels were a widely traded commodity raises the likelihood of 'fluctuating values', that is, the idea that a given vessel type's relative value (or function etc.) will vary with distance, or even just changing cultural or socio-economic contexts.

Another major restriction on Islamic glass studies is the lack of an explicit typology or even terminology for talking about vessel glass types and forms from this period. This is perhaps the most damaging factor holding back current understanding of vessel function, chronology and provenience. Typologies are far from perfect tools, however, they offer a useful means of simplifying complex data sets to a level where the key information is retained, as well as providing ready means for comparative analysis. 'Typologising' seems to have been a relatively unpopular pastime for glass specialists in recent years, with even Romanists remaining heavily reliant on Ising's early efforts (Isings 1957). In the context of the Indian Ocean, most glass studies have adopted rather *ad hoc* approaches to typology, with few reports sharing the same categorical approach. One outcome of this is that it is difficult to compare material between assemblages, with the further effect that knowledge of the function, chronology and provenience of a particular type or form does not easily accumulate over time. The result is, returning to the words of the late David Whitehouse, nothing short of 'chaotic' (Whitehouse 2000: 2-3).

Poor understanding of the chronology and provenience of the various components of the Early Islamic glass tradition is another issue which plagues the discipline at present. In most cases it is difficult to date fragments to within several centuries at best, while provenience is even less precise. Partly as a result of the problems raised above, stylistic analysis is not yet at the stage where date or provenience can be determined for all but the most diagnostic pieces. In terms of chronology, the contexts themselves from which the material originates are simply not well enough dated. The best dating evidence available comes from exceptional contexts, such as burial crypts in the Far East like the Famen Pagoda in China, sealed in AD 874 (Koch 1995: 498-507; An Jiayao 1991: 123-4, figs. 3-8; Jiang Jie 2010: 185-86, pls. 1-6), or shipwrecks, whether the early 11th century AD Serce Limani wreck in the Mediterranean (Bass 1984) or the series of Southeast Asian wrecks (Stargardt 2014). Scientific techniques can help, particularly in regard to distinguishing 'plant ash' from 'natron' glass before the 9th century AD, but correlating known compositional groups with specific proveniences and chronologies has proven problematic, not least owing to the large degree of recycling in glass.

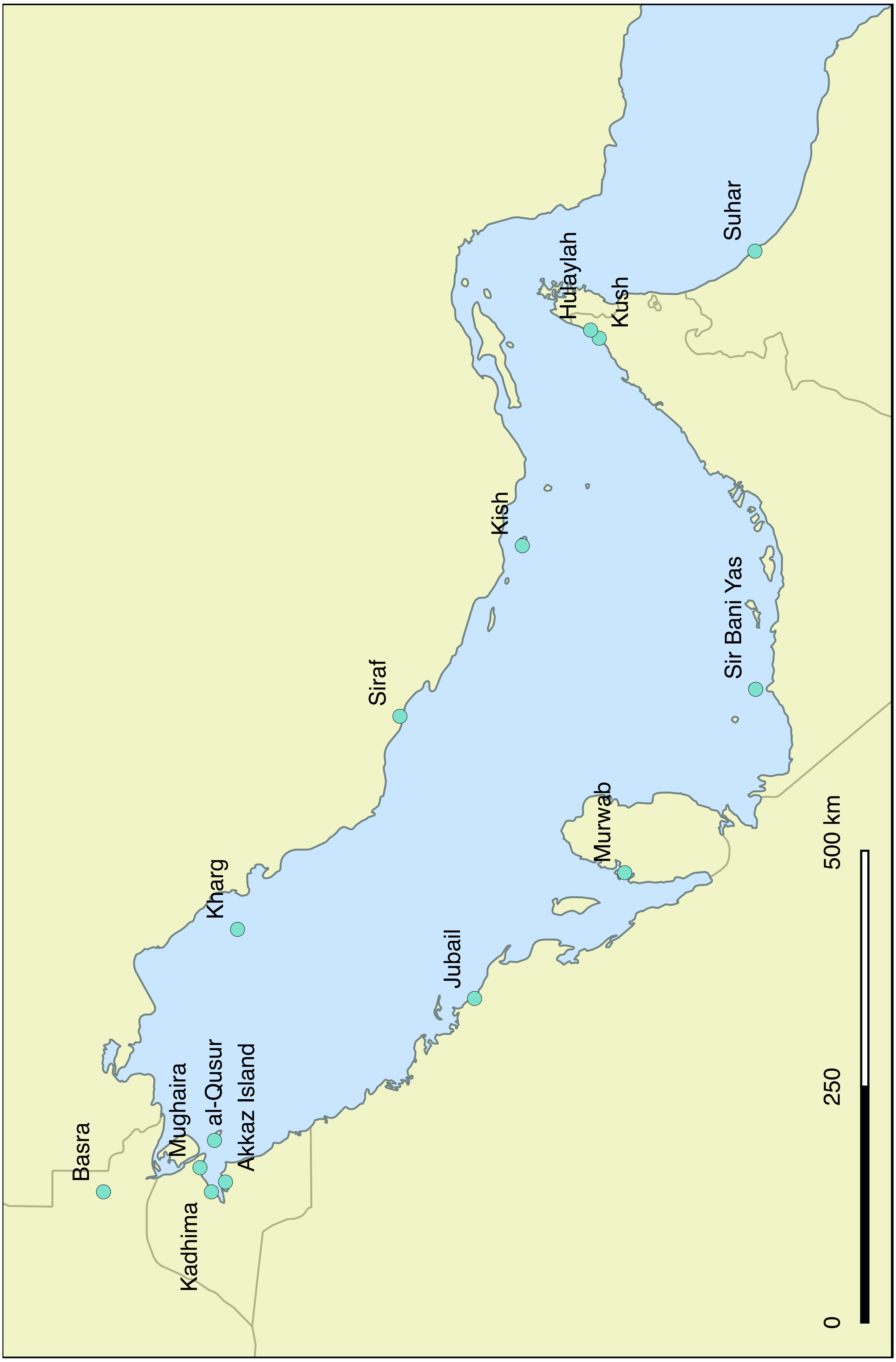


FIG 1.3. KEY SITES OF THE PERSIAN GULF

The absence of any standardised typology or approach to categorisation is itself part of a wider lack of an established theory and methodology for dealing with archaeological assemblages of vessel glass. This is not only true in terms of how researchers approach and deal with archaeological material, for example in terms of what information to record and how to approach issues such as quantification, but also in terms of a general failure to link glass studies to bigger questions. Any advance on this front will require greater attention to theory and methodology, as well as an honest consideration of what archaeological vessel glass assemblages have to contribute to studies of world history.

1.3. Wider context: the Indian Ocean in the Late 1st Millennium AD

Any introduction to this thesis would not be complete without a consideration of the wider context, the arena in which the discussion of the glass is played out. The late 1st millennium AD presents a world in flux, in which the old systems of power and economics were being overwhelmed and replaced by new spheres of influence, increasingly centred on a maritime body in the guise of the Indian Ocean. In the next few sections the chapter considers this chronological context, highlighting the key developments in the geographic study areas most relevant to this thesis - the Persian Gulf and the East African coast - before ending with a brief consideration of the rise of Indian Ocean ‘trade’ and the Indian Ocean ‘world’. Not only are these sections important by way of contextualising the following research, they are integral to how the glass assemblages themselves should be interpreted.

1.3.1. Developmental Trajectories: the Persian Gulf and the East African Coast

1.3.1.1. The Persian Gulf

The modern state of Kuwait is sandwiched between Arabia, Iraq and the Persian Gulf (Fig. 1.3). These areas possess a deep history of settlement, owing to the early emergence of complex societies in these and contiguous regions. So too do they possess a considerable antiquity of interregional interaction and trade. The earliest such interaction between the Gulf and Mesopotamia is visible in the proliferation of Ubaid pottery at over 60 coastal settlements in the 6th-5th millennia BC (see Carter 2006; Masrey 1997; Piesinger 1983; Oates 1993; Potts 1990), while the Bronze Age saw increasing and wider interaction between Sumerian and Akkadian Mesopotamia, the Harappan civilisation, and eastern Arabia’s Umm an-Nar and Dilmun cultures, with the Persian Gulf acting as a maritime bridge between these regional polities (see Ratnagar 2004 for an overview of the textual and archaeological evidence). While these and later developments, particularly during the Hellenistic/Parthian periods, are of great interest, space constraints make it necessary to delve straight into the immediate historical context preceding the rise of the Kuwaiti sites. As such, this overview begins in the Sasanian period - the mid-1st millennium AD.

There are different opinions as to the degree to which the Sasanians enjoyed imperial control over the Persian Gulf during the centuries immediately preceding the Islamic conquests. Geographically speaking the Persian Gulf is central to the Sasanian world, their sphere of influence covering Iran and Mesopotamia, with their capital at Ctesiphon in Iraq. Daryaee suggests they considered the Persian Gulf something of a ‘Mare Nostrum’, much more so than the Parthians ever did (Daryaee 2009: 56). Based mainly on historical sources, Daryaee argues that control of the Gulf via a system of forts and ports allowed the Sasanians to protect their empire against unruly Arabia as well as to secure access to Indian Ocean trade and to dominate access to markets in India and China, particularly after conflict with the remains of the Roman Empire from the 2nd-3rd century AD had made an overland ‘silk road’ more problematic (Daryaee 2003; Daryaee 2009: 63). Daryaee even provides an economic model, suggesting that while the state maintained security and minted currency to support trade, ultimately control of that trade was left in the hands of private merchants (Daryaee 2009: 65). Furthermore, he suggests that this economic model was handed-down into the Early Islamic period, representing the roots of the latter’s prosperity in the wider Indian Ocean (Daryaee 2009: 57).

In contrast, Kennet has argued convincingly that the Sasanian period represents a phase of decline in Arabia and the Persian Gulf region (Kennet 2005; Kennet 2007). Kennet suggests that while historical evidence for a Sasanian presence in the Persian Gulf exceeds that for the Parthian period, in archaeological terms the earlier period is much better represented. Kennet’s argument is based on a demonstrable decline in settlement numbers and size, as well as reductions in circulation of coinage as well as the limited Sasanian period activity at Siraf, Khatt, Suhar and Kush (Kennet 2007). Most of the major Parthian period sites, such as ed-Dur and Mleiha, had declined by the 3rd century, even disappearing by the 5th century (Kennet 2007: 104; Haerinck 2001). Previous speculation that Nestorian monastic activity was important from the 4th-5th centuries can now be disregarded, with the historical and archaeological evidence now in better agreement over a chronology for the main sites - including

Kharg, Sir Bani Yas, al-Qusur, Jubail and Akkaz Island reefs - beginning no earlier than the late 7th century (Payne 2011: 98; Carter 2008; Kennet 2007: 89-93; Beaucamp & Robin 1983). With little evidence for activity dating to the Sasanian period, this again supports Kennet's argument for a regional decline (Kennet 2007: 89-93).

Thus at the point of the rise of Islam in the 7th century AD, settlement and economy around the Persian Gulf appears to have been at a low point (Kennet 2007: 89-93). While Mesopotamia and southwest Iran appear more substantially developed, the eastern Arabian peninsula itself appears to have been primarily inhabited by small-scale and dispersed Bedouin communities based around a number of Oasis settlements (Hourani 1991). The accession to power experienced by Mohammed took place in the Hijaz region, and was more or less complete by AD 629. While this region was closer to the Red Sea than the Persian Gulf it did not take long for the new polity to expand across the entirety of the Arabian peninsula, eventually usurping the Sasanian empire in the east and that of the Byzantine and their vassals in the Levant. The Umayyad caliphs administered this new empire from Damascus, with the Abbasid coup subsequently shifting the focus of power to Iraq, at times based at Kufa, Baghdad and Samarra.

By the 7th and 8th centuries AD there was thus a close link between Iraq, with its seats of power, wealth and population, and the Persian Gulf. It is at this time and in this context that the main part of the occupation of the Kuwaiti settlements should be understood - an intensity of occupation that will not last beyond the 9th century and not be repeated for centuries to come. In Iraq, the foundation and growth of new cities usurped and replaced the pre-existing Sasanian power structure, while higher population and wealth-led demand and enhanced administrative control allowed an expansion in agricultural and industrial production. In southern Iraq, the foundation and success of Basra in AD 636 and the progressive draining of previously unproductive marshland exemplify the changes afoot in the first few centuries of the Islamic period.

Kennet gives a useful overview of the development of eastern Arabia and the Persian Gulf region, breaking the late 1st millennium AD down into a number of chronological phases (Kennet 2012). The development of this region starts from a period of low activity in the 5th-7th centuries AD, for which Kush is one of the few sites which shows a continuity of occupation through the other side of the 7th century, while a similar though admittedly more complicated phenomenon is apparent on the Iranian side of the Gulf (Kennet 2012: 192). From this low base the 8th century AD is taken to represent something of a revival in the region's fortunes, with an increase in the quantity, scale and wealth of settlements across the Gulf region. It was earlier noted that the foundation and expansion of monastic settlements date to this period, representing the high point of Christianity in the Gulf. Other more domestically-oriented settlements include Hulaylah (Sasaki & Sasaki 1996, 1998), Suhar (Kervran 2004), Murwab (Hardy-Guilbert 1984; Guerin & al-Na'imi 2009), numerous sites in northern Qatar (McPhillips *et al.* 2015), and of course the Kuwaiti sites discussed in this thesis (Kennet *et al.* 2011; Blair *et al.* 2012).

Moving on to the 9th century AD, Kennet argues for a 'regional boom in trade, settlement and urbanisation' in and around the Gulf, as epitomised by the growth of Basra, Siraf and Suhar, and reflecting a wider Abbasid expansion in general (Kennet 2012: 195). This was not a case of straight-forward evolution, however, as many of the sites occupied in the 8th century AD decline completely, including Hulaylah, Jubail, al-Qusur, Sir Bani Yas, and, as shall be seen in later chapters, the coastal settlements of mainland Kuwait (Kennet 2012: 193; Kennet *et al*. 2011; Blair *et al*. 2012). This conflicting pattern of success and decline denotes a reorientation or restructuring in settlement patterns in the Persian Gulf at this time, the exact reasons for which are unclear. One suggestion is that smaller, locally-oriented sites, along with the Christian monastic settlements, undergo a rapid and pronounced decline, whereas those with a broader outlook and a role in wider networks of trade and interaction, such as Kush, Siraf and Suhar, continue to be occupied.

This leads neatly into a discussion of the role of the Persian Gulf as a link between the central Islamic lands and the wider Indian Ocean, and the importance of that role for understanding its trajectory of development. The large population centres of the Islamic world harboured considerable wealth and thus drove demand for natural and manufactured goods from a wide area extending to India, China and East Africa in the context of the Indian Ocean. In return, Islamic manufactured goods, including glass, and other surpluses were exchanged. The centralisation of power along the River Tigris and Euphrates from the Abbasid period, whether at Baghdad, Samarra or Basra, meant that the Persian Gulf was to play a central role in linking this centre of wealth and population with the wider Indian Ocean. As a result various settlements in the Gulf were to benefit economically, while in turn the opportunities for Indian Ocean trade which the Gulf offered were advantageous for central Iraq. Whitcomb argues that Baghdad benefited economically from the organisation of the trade (Whitcomb 2009: 72). He also highlights the importance of Basra, which Muqaddasi described as "a port on the sea, and an emporium of the land". Basra's location between the Gulf and the Shatt al-Arab, as well as on land routes to much of Arabia and southwest Iran, made it the main nodal point linking the Islamic world's wealth, power and population with the wider Indian Ocean.

Within the Persian Gulf proper, Siraf played an equally important role with its links to Basra, southwest and central Iran, and the network of smaller Gulf settlements, giving it a central position "in control of long-distance shipment and perhaps, cargo transfer within the network of Persian Gulf trade" (Whitcomb 2009: 76). In the 8th and 9th centuries AD, Siraf dominated Persian Gulf relations and exchange with India, China and East Africa, while also providing a vital link between these regions and central Iraq. This state of affairs lasted until the 10th century AD when the fortunes of Siraf changed following the devastating AD 977 earthquake, with an increasing compartmentalisation in terms of how trade was organised and a corresponding shift in focus closed to the entrance to the Arabian Sea (Whitcomb 2009: 78). Kish became the region's main entrepôt in the 11th century (Whitcomb 2009: 78).

How then can these two different developmental trajectories be unified - that of the rapid rise and decline of a number of locally-oriented and monastic sites with the more progressive rise and greater longevity of sites involved in inter-regional trade? Regarding the rise and success of the latter, Chaudhuri offers an explanatory model in which he distinguishes two aspects of Indian Ocean trade which apply to the Persian Gulf; one involving intra-regional exchange between centres of trade within a single region, such as between Basra, Siraf and Kush and their inland partners, the other involving long-distance inter-regional exchange, such as between Siraf and China, India or East Africa (Chaudhuri 1985: 15, 37). Chaudhuri argues that the administrative and economic impact of the rise of Islam and the unification of China from the mid-7th century AD were the main sources of demand upon which the expansion of Indian ocean trade was based (Chaudhuri 1985: 34-6). Until the start of the 10th century AD, for example, Arab ships would make the long journey to China and back in its entirety, stopping at a variety of intermediate markets along the way. Not only was this of benefit to the main emporia, but also to nearby regional centres which could engage in intra-regional redistribution of exotic commodities. After the 10th century AD, however, the costs and risks of the voyage from the Persian Gulf to China incentivised a segmentation of the trade into shorter journeys "between a number of leading port-cities which were situated at the circumference of the maximum navigational circle" thus explaining why Siraf may have lost its important role in favour of Oman and Kish from this time (Chaudhuri 1985: 39-41).

The rise and fall of the smaller, locally-oriented sites at the end of the 8th or start of the 9th century AD is a phenomenon which is proving more difficult to explain. Their rise may be explained in each case by site-specific factors, though these tend to reflect common themes taking advantage of the economic peak which the late 7th and 8th centuries AD bring about. One such general factor could have been the role of central government in providing regional administration - bringing opportunities for decentralised or local resource administration and exploitation while enhancing security. The widespread pattern of decline by the 9th century AD occurs in too many instances to be easily explained by site-specific factors. While simply reversing the proposed pattern of development highlights a decline of administrative control and security as the Abbasid empire gets into increasing difficulties - particularly in the more unruly areas of southern Iraq and the Persian Gulf - there does not seem to be any direct relationship between the rise and decline of the given sites and the patterns of Indian Ocean trade seen at a higher level on the economic scale. As such, one might be forced not to reconcile these two developmental trajectories but rather to see them as parallel developments, concurrent phenomena but ultimately separate in cause.

1.3.1.2. The East African coast

To understand the origins and significance of Unguja Ukuu, it is necessary to consider not just East Africa's internal developmental trajectory up to the 10th century, but its particular relationship with the Indian Ocean and thus its connection to the central Islamic lands through the Persian Gulf. The inhabitants of the East African coast have long since oriented themselves not towards their terrestrial hinterland but outwards, toward the sea. This state of affairs was already well established before the entry of the Europeans into the western Indian Ocean, as Vasco da Gama discovered when he landed on the coast in AD 1497. The people da Gama encountered, the Swahili, were thoroughly cosmopolitan, adhered to the Islamic faith, and saw their origins not on the African continent, but as colonies of Persian and Arab immigrants. It is testimony to the connectedness of this coastline that da Gama was able to find a pilot in Malindi capable of guiding his armada across the open sea to Calicut on India's Malabar coast.

The story behind the emergence of a socio-economically complex East African coast and the birth of its maritime connections with the Near East has had several different versions over the decades. During the 1960s and 1970s the coastal towns were considered as colonies of Arab and Persian traders said to have settled the coast from the early 2nd millennium AD (Chittick 1963, 1965, 1969). This view was heavily influenced by the Swahili foundation myths recounted in the Lamu, Pate and Kilwa chronicles (Allen 1981: 207; Nurse & Spear 1985; Spear 2000: 258-9), and apparently supported by linguistic evidence, which emphasised the influence of Arabic on local languages (Spear 2000: 258), and the practise of Islam. The 'colonist' theory was also grounded in the contemporary colonial attitudes which influenced the European academics working in Africa at the time (Horton n.d.: 3). It is in these attitudes which one finds the origins of the otherwise unsubstantiated belief that urbanism and stone architecture were so 'un-African' that they could only have been introduced from abroad (Kirkman 1964: 22; Garlake 1966: 2; Spear 2000: 257-8).

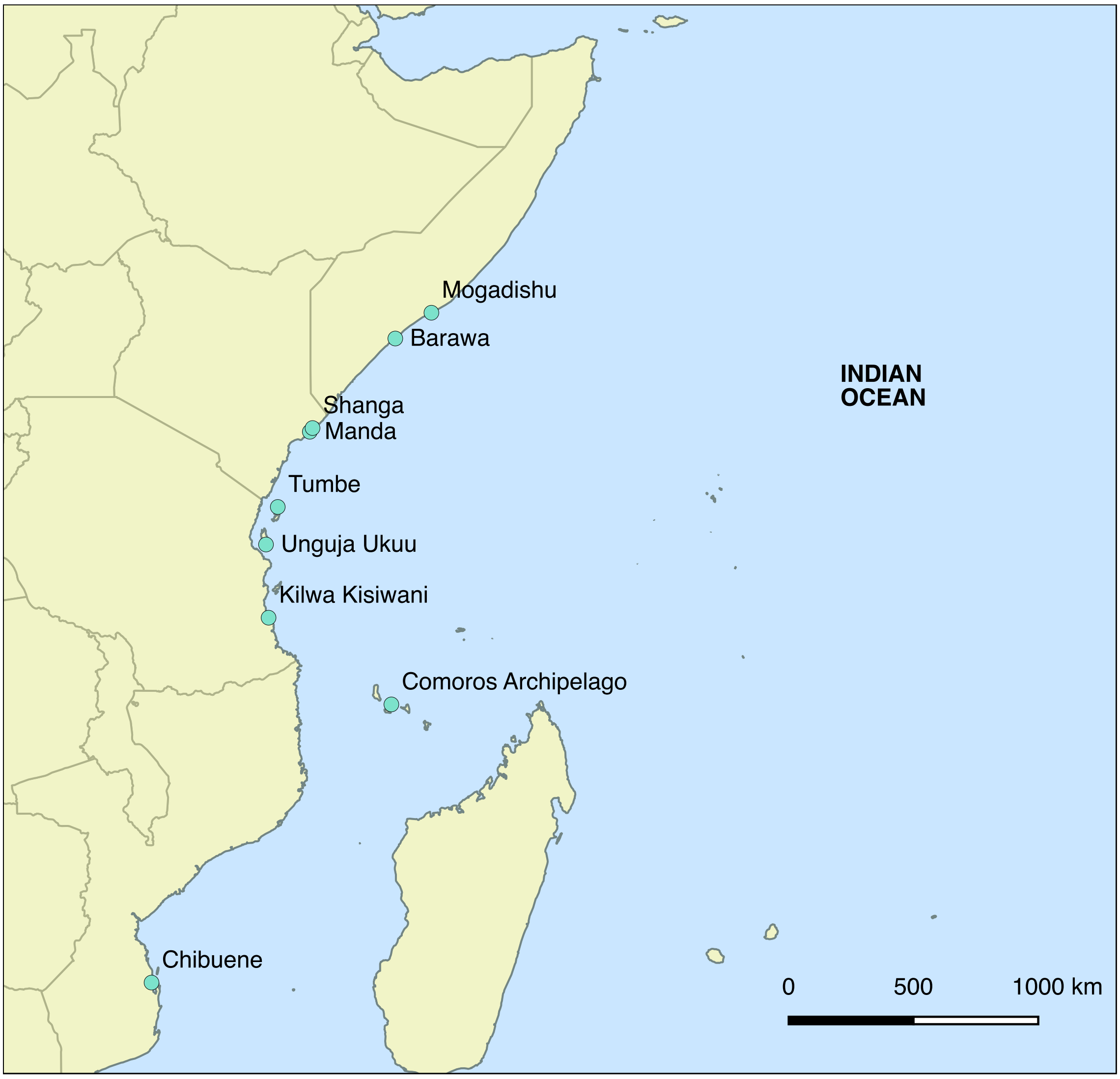


FIG 1.4. KEY SITES OF THE EAST AFRICAN COAST

Allen questioned how this model could have persisted into the 1980s, as seen, for example, in Chittick's conclusion to the Manda excavation report (Chittick 1984: 217): "we conclude that the impetus to the creation of this town was due to the settling of immigrants who came from the Arabian/Persian Gulf". In fairness, although doubts had been raised decades earlier (Matthew 1963), an absence of sound archaeological evidence to the contrary left it not unreasonable to conclude that both the settlement of the coast and the development of trade were initiated concurrently from abroad. Eventually, through a careful reading of new and existing evidence, ideas began to change. The excavation of several stone towns along the Swahili coast, specifically Kilwa, Manda and Shanga, showed that the settlements were not Islamic trading colonies but grew up organically from indigenous villages of 'farmers, fishers and traders' no later than the 9th century (Spear 2000: 258). The integration of the results of these excavations, along with revisions of the aforementioned historical and linguistic evidence (Allen 1981; Nurse & Spear 1981; Sinclair 1991; Nurse & Hinnebusch 1993; Spear 2000; Horton & Middleton 2000; Horton n.d.), consequently invigorated an exciting quest to understand the indigenous development of settlement and trade on the East Africa's coast in the late 1st millennium AD.

The lead up to the socio-economically complex society of the late 1st millennium AD is a shorter affair than that witnessed in the Persian Gulf. The East African coast boasts no deep chronology of complex settlement and long-distance exchange, with only a few non-direct and non-reciprocal instances of the latter indicated by genetic transfers with South Asia and the odd piece of raw material from the region cropping up in Mesopotamia (see Fuller & Boivin 2009: 4-6; Meyer et al. 1991: 289). Later, 1st millennium BC Greek and Egyptian texts are sometimes cited as evidence that East Africa had entered the consciousness of greater Eurasia (Chami 2002; Chami et al. 2002), yet these texts are better understood as utopian stories which served to order the poorly-known world within a Greek mindset, rather than of value in understanding the East African coast at this time (Cary & Warmington 1963: 111-24; Posnansky 1981: 547-8; Zayed 1981: 148-9; de Angelis & Garstad 2006: 212; Garstad 2003: 309). Rather, to understand the development of the East African coast, it is necessary to begin in the early 1st millennium AD.

In the first half of the 1st millennium AD, the Early Iron Working (EIW) period as its known (1st-5th century AD), the East African coast appears to have been settled by Bantu-speaking communities, recognised materially by their 'Kwale' ceramic tradition and living in a series of small village settlements engaged in iron production. The Kwale bearing settlements of the EIW exhibit a long, linear coastal distribution suggesting the inhabitants had maritime skills, and thus beginning a culturally-defined coastal settlement pattern which is to have lasting effects through to the present day (Horton n.d.: 3; Chami 2006; Chami 1999; Chami & Msemwa 1997; Fawcett & LaViolette 1990; *contra* Horton 1990: 96). Contemporary with the early EIW communities are a number of external literary sources which appear to link the East African coast to the Roman world, specifically the anonymous *Periplus of the Erythraean Sea* (AD 40-70) and Ptolemy's *Geography* (2nd century AD). Together these sources refer to the East African coast as 'Azania', and record the exchange of weapons, tools, 'glass stones', grain and wine for African ivory, tortoise shell and nautilus shell (Casson 1989; 59-61; Seland 2010: 43-4; Datoo 1970). An uncritical acceptance of the validity of these claims has led to hypotheses which emphasise the opportunities presented by this trade as encouraging a proliferation of coastal occupation (LaViolette 2009: 29; Spear 2000: 280), whereby the EIW sites discussed above are equated with the 'agricultural communities' supposedly mentioned by the author of the *Periplus* (Horton n.d.; Vasina 1997 - questions whether this translation is indeed correct).

In spite of the seemingly solid textual evidence it has proven impossible to correlate any such settlement mentioned in the text with actual places on the East African coast. The exception is the correlation of 'Opone' with Ras Hafun on the horn of Africa, which actually sits more in the Gulf of Aden and the entrance to the Red Sea. Indeed, finds of Roman or Middle Eastern origin from this period are incredibly rare and all problematic. The numismatic evidence can be all but discounted, having been shown to have arrived in East Africa during the last few centuries thanks to private collectors (Horton 1996a). Otherwise, claims of 'Frankish' beads identified by Harding could just as easily be Islamic in date (Horton 1996a; Harding 1960). On a darker note, Felix Chami's claim for an 'incontrovertible' link with the Periplus (Chami 1998; 1999a; Chami & Msemwa 1997; Chami & Mapunda 1997) borders on deliberately misleading, amounting to no more than four glass beads from Mkututu - all of which are of highly questionable typological dating, originate from disturbed and unreliable contexts overlain with late 1st millennium AD material, were excavated with poor stratigraphic control, and indeed represent the only imported material at the site. Other claims of glass "comparable to wares observed at the Greco-Roman site of Fayum" are completely unsubstantiated (Chami & Msemwa 1997: 674-675).

This absence of archaeological evidence contrasts with the otherwise reliable *Periplus* suggesting that either it continues to evade discovery or, as is increasingly more likely with time, that the author of the *Periplus* was mis-informed or mistaken about this area or that the texts have subsequently been misinterpreted. Indeed, the situation is in stark contrast to the situation in the Red Sea or India, where the *Periplus* can be correlated with discoveries of major quantities of Roman and Near Eastern material of early 1st Millennium AD date (Wheeler *et al*. 1946; Cherian *et al*. 2009; Meyer 1992). One thing that may be of further significance is that Strabo, writing centuries later, admits to knowing nothing of the East African coast below the horn. Perhaps the most damning indictment of the *Periplus* and the *Geography* is the contrast between the contemporary archaeological evidence for settlement and that accompanying the later development of the coast.

After AD 500 there appears to have been a wave of increasing settlement activity on the East African coast which continued throughout the next few centuries. Such settlements are identified on the basis of so-called 'Tana' ceramics - particularly Triangular Incised Wares - iron-working and bead-making crafts, subsistence fishing and agriculture (Spear 2000: 268). A particularly striking feature is that the Tana boom appears to have been relatively culturally homogenous despite stretching over 2000 km of coastline, as well as up to 250 km inland in places. Its geographic distribution consists of a similar but expanded version of the Kwale period sites.

Another feature of the Tana communities is their clear involvement with the wider Indian Ocean trade. Excavations have shown that many of the major medieval trading emporia of this region have Tana pottery in their basal levels, and thus a link has been proposed between the emergence of the Tana tradition in the 6th century AD and East Africa's involvement in Indian Ocean trade (Chittick 1974; Chittick 1984b; Horton 1996b; Juma 2004: 87). There is, however, no neat correlation between the two. First, while Tana material culture appears up to 250 km inland, imported material from the Indian Ocean world is strictly confined to a narrow coastal strip extending no more than a few kilometres inland (Horton n.d.: 4; Nurse & Hinnebusch 1993). Furthermore, while Tana wares (and the contexts in which they are found) date from as early as the 6th century AD, solid evidence for foreign imports along the East African coast do not surface until perhaps as late as the 8th century AD. Previous identifications of earlier material are problematic and/or have been revised upwards. The examples of the so-called 'Sasanian-Islamic' blue-green glazed ceramics probably relate to material current from the 8th century AD. This terminology refers to a distinctive glaze with a long chronology stretching from the Parthian to Early Islamic periods but which exhibit different styles and forms. As such, it has long since been abandoned in discussions of glazed ceramics in the Near East in favour of the term Turquoise Glazed Ware (TURQ). Nor are there any other examples of Sasanian material on the coast. As this thesis will later show, there is no good evidence for pre-8th century AD glass at any of the East African sites, again supporting an 8th century AD date for the integration of the East African coast in the Indian Ocean trade.

Several sites are key to providing an understanding of the development of the East African coast in the latter centuries of the 1st millennium AD, and thus the historical and regional context for Unguja Ukuu. In Kenya are the sites of Shanga and Manda, both extensively excavated under the auspices of the British Institute in Eastern Africa in the 1970s and 1980s (Chittick 1984; Horton 1996b). The development of Shanga, as presented by Horton, is that of a small indigenous fishing village established in the second half of the 8th century AD, which from its earliest years was engaged in trade with the Persian Gulf. Both the village and the trade expanded over the next centuries, importing both material and non-material culture, most notably Islam. Horton has dated a wooden mosque and Muslim burials to the years before AD 850. The boom in trade at Shanga indicates an increase in the inhabitants general prosperity; a fact most clearly recognised during the mid-10th century in the erection of coral buildings and the beginnings of a 'stone town'. A similar picture can be seen at Manda. Chittick's initial suggestion that the site was settled as a Persian/Arabian colony in the mid-9th century (Chittick 1984) was later revised to an earlier date by Horton based on a reevaluation of the dating of key Chinese and Middle Eastern pottery, arguing that Manda "was already a flourishing community between 800-850 AD" that had been engaging in Indian Ocean trade from the later 8th century AD (Horton 1986: 202-4). Like at Shanga, there is a transition from timber to stone architecture in the 10th century (Horton 1986: 204). In each case the same pattern manifests itself: an indigenous settlement, initially surviving on local resource exploitation and craft production, engaging in trade with the wider Indian Ocean region from the 8th century AD, experiencing increasing prosperity by virtue of this link leading to greater quantities of imports and substantial settlements with timber and coral rag architecture, and eventually integrating non-local cultural traditions into local society, notably the adoption of Islam.

This model is repeated time and again along the East African coast, with minimal local variations. The Tanzanian site of Kilwa Kisiwani, located like the Kenyan sites on a near shore island, was subject to the first 'large-scale excavations' in Tanzania, again conducted by the British Institute in Eastern Africa (Chittick 1974: 3). Despite its distance from northern Kenya, the picture presented at Kilwa is almost identical to that of the sites in the Lamu archipelago. The town's origins were pre-Muslim, the inhabitants living in timber structures, exploiting the local resources and conducting iron and bead-making industries and using the same Tana ceramics (Spear 2000: 263). Chittick's dating of his earliest phase (Period Ia) to from c. AD 800 can probably be revised down somewhat based on a better understanding of the date of his key chronological type fossils [Sasanian-Islamic and White tin-glazed wares] to include the mid-8th century AD. One striking disparity with early trading assemblages elsewhere on the coast is the absence of Chinese ceramics in the early phases of occupation, with such material absent until at least the 12th century.

This picture is continued further south. In Mozambique, a similar combination of local and imported material culture at Chibuene suggests that the site was both settled and involved in Indian Ocean trade from the 8th or 9th century AD (Spear 2000: 264; Sinclair 1982). Some 300 km off shore the Comoros archipelago holds evidence of settlement and trade from the 9th century AD, locally known as the 'Dembeni' phase, with a single village dominating each of the four islands (Spear 2000: 264; Wright 1984; Wright 1992; Allibert *et al.* 1983, 1990; Allibert & Verin 1996). Again a similar settlement pattern presents itself, whereby timber and mud buildings housed communities of subsistence agriculturalists who also exploited the marine resources (fishing) and engaged in iron working while importing non-local material along the Indian Ocean networks from their earliest phases. The picture starts to tail off as one enters southern Mozambique and northern Madagascar. In regards to the later, Spear suggests that involvement in coastal society and Indian Ocean trade was much less marked; while occupied by the 9th and 10th centuries AD, "many of the earliest settlements were mere shelters established for the annual trading seasons…" (Spear 2000: 265; Wright *et al.* 1996; Dewar 1996; Verin 1986; Radimilahy 1998; Beaujard 2007; Blench 2007; Chittick 1977; Dewar 1993).

Finally, returning to the north, southern Somalia represents one of the most intriguing areas of the East African coast. Like the rest of the coast, southern Somalia appears to engage with the Indian Ocean from the 8th century AD. However, here the picture is very unclear owing to three decades of civil war, terrorism, piracy and the subsequent breakdown of law and order. That said, a number of early surveys and basic excavations evidence Indian Ocean imports from the 8th or 9th century AD (Fitzgerald 1892; Elliot 1926; Grottanelli 1955a; Fattovich 1992; Chittick 1969a; Chittick 1984a;

Sanseverino 1983; Sinclair 1991; Broberg 1995; Dualeh 1989). The earliest medieval settlement for which there is good evidence of Indian Ocean trade is that of Gezira, with Near Eastern wares dated to around the 8th or 9th century AD (Chittick 1969a: 118; Spear 2000: 263). To this Spear adds Mogadishu and Barawa as potentially occupied from the 8th or 9th century AD, based on the presence of the ubiquitous 'Sasanian-Islamic wares' (Spear 2000: 263), though both were heavily occupied in later centuries up to the present day and the earliest phases are covered by deep stratigraphy or otherwise destroyed (Chittick 1969a).

It is in this wider context of development and trade that Unguja Ukuu and of course its glass assemblage must be understood. Glass, being a commodity imported from the Near East, should help to better understand the influence of trade on Unguja Ukuu, as well as how non-local materials were coopted by East African communities. But in all this it must be borne in mind that Indian Ocean trade was not the 'be all and end all' for the development of the East African coast. Priestman, in his recent PhD thesis, has quantified the amount of imported ceramics at a number of sites around the Indian Ocean rim, including in East Africa, noting that in every case local material culture vastly outnumbered imported pottery (Priestman 2013). Glass does not appear to have a local counterpart, yet still the point remains that local products will have formed a much greater part of material life than exotic ones. Indeed, travel just a few kilometres from the coast and imported ceramics and glass become incredibly rare finds. This is interesting as the same pattern is seen in the uptake of the Islamic faith, yet local material culture is confined by no such barrier. As such, understanding the role of exotic material culture at sites like Unguja Ukuu, its relation to other imported and local material culture, and the wider relationship between Unguja Ukuu and other sites in the region is more significant that it might appear at face value.

1.3.2. From Indian Ocean 'trade' to an Indian Ocean 'world'?

It remains then to consider the bigger picture, asking how the above strands of discussion can be connected into an overarching framework. Here the Indian Ocean becomes a useful concept - not merely for its *geography,* as a simple body of water, but for its *history*, as an Indian Ocean 'world'. Up to now this thesis has focused on regional developmental trajectories and the corresponding involvement of those regions in long-distance trade within the Indian Ocean region, particularly its western part. It is worth giving brief consideration to some implications that such interaction necessitates.

Trade was a source of unity within the Indian Ocean

This is perhaps the most common theme promoted by scholars of the Indian Ocean in recent decades including, among others, K.N. Chaudhuri (1985, 1990), Kenneth McPherson (1993), Michael Pearson (2003) and Abdul Sheriff (2010). The key factor here is less the economic benefits or ties of trade, but the reciprocal and regularised communication networks along which it took place. For example, trade-driven communication was at the heart of Andre Gunder Frank's influential model of an Asia-centric world-system with an antiquity stretching back into the Bronze Age (Frank 1998). Chaudhuri, in his seminal *Trade and Civilisation* (1985) and *Asia Before Europe* (1990)*,* repeatedly returned to the theme of long-distance trade as the cornerstone of his Indian Ocean, "…trade which flowed through the caravan towns, major seaports, and primate cities" and which "…fashioned an immense chain of economic and cultural interdependence" (Chaudhuri 1985: 148).

This was not a purely economic relationship

Trade, if that term is even appropriate, was not the end but the beginning of exchange. When people move around, they bring much more than physical goods with them. They helplessly carry their cultural traits, their beliefs, traditions and ideas, even their DNA with them. Opportunities for cultural exchange were ripe in the Indian Ocean trading system, particularly thanks to the patient rhythm of the monsoon. For example, Arab merchants visiting East Africa or India would travel in the direction of the prevailing monsoon winds and then, like it or not, have to wait weeks or months for the winds to reverse before travelling home again.

Cultural unity is a step too far

Cultural exchange aside, most scholars agree that to speak of cultural unity would be a step too far. As McPherson comments (1993: 4):

> "…the 'Indian Ocean world' … was not a unitary cultural area. It was an area which included an enormous range of cultural and economic practices, bonded and defined by its unique maritime trading system, which provided the peoples of that 'world' with an economic unity and certain cultural commonalities which set them apart from the peoples of other contiguous 'worlds' such as the Mediterranean and East Asia."

Indeed, in awkward contrast to trade, economy and even geography, many see culture as the great dividing factor. Thus Chaudhuri writes that "religion, social systems and cultural traditions" provided a series of contrasts, with unity achieved through "means of travel, movement of peoples, economic exchange, climate and historical forces" (Chaudhuri 1985: 3)

The Indian Ocean is the level of analysis at which this unity is best expressed

This idea is hidden quietly in the last points, but underpins their veracity. The idea of the Indian Ocean as a unit of analysis emerged throughout the 20th century, though its historiography has been rarely considered (Arasaratnam 1990; Vink 2007). Western colonial interests were the initial impetus (Danvers 1824; Moreland 1920, 1923; Warmington 1928; Wheeler 1955), followed in the latter half of the century by a desire to understand the deeper themes (Villiers 1952; Toussaint 1968) and retell that history 'from within' (Hourani 1951; Simkin 1968). Theoretical developments outside of the region transformed this understanding even further. The new style of maritime history contained in Braudel's *La Méditerranée* (1949) eventually had a huge effect on the birth of the idea of an Indian Ocean world, mainly thanks to the appropriation of these ideas by K.N. Chaudhuri (1985; 1990). So too did Wallerstein's *Modern World System* (1974), and its application to Asian history by Abu Lughod (1989), Frank (1998), Beaujard (2005; 2012) and others. The result: today one can draw on a large number of volumes which aim to tell the history *of* the Indian Ocean rather than purely history *in* the Indian Ocean.

A circular argument?

Chaudhuri was keen to demonstrate that the idea of the Indian Ocean as a historical unit was not abstract, nor an etic or even orientalist perspective imposed from the present upon the past, but one that made sense to its inhabitants throughout this period in history (Chaudhuri 1985: 21):

> "The idea of a common geographical space defined by the exchange of ideas and material objects was quite strong, not only in the minds of merchants but also in those of political rulers and ordinary people."

However, there is certainly a case of circular reasoning here. The more the world is seen through the lens of the Indian Ocean, the more that perspective is projected onto the past. One of the reasons for the success of maritime perspectives on history, like those of the Indian Ocean, are that they provided an alternative framework to the traditional terrestrial models which had been discredited in the post-modernist deconstructionism which characterised those iconoclastic years of the late 1980s and 1990s (Bentley 1999; Wigen 2006; Horden & Purcell 2006). Yet in their success, maritime histories may have simply replaced a ‘myth of continents’ (Lewis & Wigen 1997, 1999) with a ‘myth of oceans’ (Lewis 1999). Sanjay Subrahmanyam, although he was writing about Southeast Asia rather than the Indian Ocean *per se*, warns against taking such weighty constructs for granted (1997: 742):

> “It is as if these conventional geographical units of analysis, fortuitously defined as givens for the intellectually slothful, and the result of complex (even murky) processes of academic and non-academic engagement, somehow become real and overwhelming. Having helped create these Frankenstein’s monsters, we are obliged to praise them for their beauty, rather than grudgingly acknowledge their limited functional utility.”

Moving forwards

When then to make of this influential, undoubtedly useful, but ultimately flawed concept of the Indian Ocean ‘world’, and how can a study of glass make a meaningful contribution? It seems that the issue central to it all is that of ‘unity’. The more unified that the Indian Ocean can be demonstrated to have been then the easier to justify its adoption as unit of historical analysis and, ultimately, the validity of the idea of the Indian Ocean ‘world’. In some ways this thesis presents a case study aimed at this question. By considering glass assemblages - an item often used to identify instances of Indian Ocean ‘trade’, the key source of such unity - from a number of contemporary sites reflecting different geographic, socio-economic and cultural contexts, it should be possible to say something about the extent to which such items created a shared material life, while at the same time exploring possibly differences and similarities in how they were understood and ultimately used. This, to conclude, is perhaps the greatest strength that archaeology has to offer: the ability to start from the smallest fragment and to finish by addressing an entire world.

1.4. Chapter Summary

This chapter began with a brief outline of the proposed contents of this thesis and has progressed to give an introduction to the topics of Early Islamic glass, the historical development of the East African coast and Persian Gulf, and the concept of Indian Ocean trade and the Indian Ocean ‘world’. It has attempted to highlight a number of issues with each of these topics, three of which stand out as subjects which this thesis can hope to make a contribution towards. First it was seen how the typological components of the Early Islamic glass tradition, that is the kinds of vessels which were in production and use during the Umayyad and Abbasid periods, are poorly understood. Second, it was noted that while glass is known to have been widely distributed and consumed at the time, little is known of how glass itself was understood and used in the Early Islamic world and beyond. Third, it has been questioned how glass and the glass trade fit into current approaches to the Indian Ocean trade and the Indian Ocean world. If the first two questions concern the discipline of glass studies in its own right, then the third concerns the relevance of that discipline to the wider questions of human history. In the next chapter the thesis progresses to turn these questions into a series of aims and objectives which the thesis will attempt to explore, before establishing a methodology by which it might hope to do so.

Chapter Two
Aims & Methodology

2.1. Research Aims

This thesis began with a statement of its intent to explore the distribution and consumption of vessel glass during the late 1st millennium AD, within the geographic context of the East African coast and the Persian Gulf. In the remainder of that first chapter, three key issues were identified as pertinent subjects for the thesis to explore. These related to: 1) the poor state of current understanding of the components of the Early Islamic glassware tradition; 2) a lack of awareness of as to the role and function of that glass in different settlement contexts; and 3) an opportunity to explore how the distribution and exchange of glass in this region relates to the wider phenomenon of Indian Ocean trade and the idea of the Indian Ocean 'world'. With these issues in mind, the thesis has adopted the following three main aims:

- To better recognise the typological components of the Early Islamic vessel glass tradition from an archaeological point-of-view;
- To assess the practical and social function of vessel glass in material life at different sites in the western Indian Ocean region;
- To examine the potential contribution that archaeological glass assemblages can make to understanding the nature of the Indian Ocean 'trade' and the development of an Indian Ocean 'world.

The outcomes relating to these and some other minor issues will be reexamined in Chapter Six. In Chapter Two, however, the thesis first explores the main aims outlined above, before formulating a methodology through which they might be attained.

2.1.1. Recognising the typological components of the Early Islamic glass tradition

Chapter One highlighted the poor understanding as to what components the Early Islamic glass tradition consists of as a major issue with the discipline, particularly in so far as it provides a critical obstacle to the exploration of other topics, whether consumption or matters of provenance and chronology. Although attempting to compartmentalise the diversity of material culture within crudely-defined spatio-temporal 'traditions' is clumsy at best, such categorisation remains one of the most useful and practical methods of dealing with large quantities of physical objects. The act of categorising objects as 'Early Islamic' or otherwise, and further 'typologising' within that group, provides a language structure which allows people to talk about that material in a way that makes sense to one other, and thus provides the agreed foundations for further analyses. Many components of the Early Islamic glass tradition effectively exist outside of such a structure, a problem which this thesis will attempt to begin to rectify by establishing and researching a typology for the vessel glass assemblages from Kuwait and Unguja Ukuu.

It was also noted in Chapter One that the little that is known regarding the components of the Early Islamic glass tradition is reliant on a small number of site reports, often outdated, and perhaps more importantly on museum and private collections which tend to bias towards exotic, unique and highly decorative pieces. As such, it is likely that current understanding is not just limited in scope but also based on a misleading corpus of evidence. With this in mind, this thesis is committed to offering an impression of the Early Islamic glass tradition that is firmly ground in an archaeological perspective. Part of this task will require some discussion of the similarities and contrasts between the 'archaeological' and the 'museum' perspective.

2.1.2. Assessing the practical and social function of glass

Chapter one demonstrated that vessel glass was widely distributed in the late 1st millennium AD, as evidenced by the fact that it is a near ubiquitous discovery in the archaeological sites of the western Indian Ocean. As such, it is fair to say that vessel glass played an active role in the 'material life' of the region, that is, the set of things with which people regularly engaged in their daily lives. As the western Indian Ocean region incorporates a diverse range of social, cultural and economic environments, it is likely that the role played by any given class of object in this material life would be equally diverse. Although this is a simple hypothesis, its validity remains little explored. Indeed, current approaches to the material landscape of the Indian Ocean world tend to view object categories in purely homogenous terms. As such, an assemblage of vessel glass (or any other category of material culture) is often assigned the same interpretation or meaning regardless of the type of vessels of which it was composed, or the socio-economic, cultural or geographic context in which it is found. For vessel glass this normally means a (false) association with the concept of 'luxury', and feeds into ideas of conspicuous consumption, high status and wealth. Instead of being content with this rather monotonous approach, it should be considered whether there are variations in the function and socio-economic role of vessel glass at different sites, and how this might be related to variations in social, cultural, economic and geographic contexts. By considering, among other things, the forms and types of glass which make up the Kuwaiti and Unguja Ukuu assemblages while paying close attention to their contexts of discovery, this thesis hopes to start making some progress in this regard.

2.1.3. Glass, trade and the development of the Indian Ocean 'world'

Although vessel glass is a widespread find around the western Indian Ocean, it is also clear that it originates from relatively few production sources. This leads to the conclusion that glass assemblages, particularly those outside the Near Eastern heartland of glass production, are excellent proxies for studying 'trade'. While vessel glass offers great potential in this regard, this is a potential that remains more or less untapped. At present, the contribution of glass to explorations of trade and exchange have been limited to distribution-oriented perspectives, with a failure to explore deeper questions such as the driving forces behind exchange, how it was organised in different regions and at different scales, and indeed whether the concept of 'trade' is a valid and useful model for understanding material exchange. This thesis hopes to move the debate along by asking what factors were responsible for shaping the patterns seen in the Kuwaiti and Unguja Ukuu assemblages, whether matters of demand and supply, availability and restrictions on access to certain material, the logistics of exchange, and its economic organisation

Chapter one also introduced the concept of the Indian Ocean 'world', which envisions the historical existence of a discrete socio-economic unit loosely bound by long-distance trade focused across and around its central feature, the Indian Ocean itself. As a concept, the Indian Ocean 'world' is to be conceived of as much as a thought-tool and a convenient framework for historical analysis than as an accurate reflection of historical reality. However, the consensus is that it represents as appropriate a model for exploring the large-scale history of the region as is currently available. The unity of this 'world' was said to have emerged out of and been maintained by 'trade', a key piece of evidence for which is the archaeological assemblages of material culture found around the Indian Ocean rim. It was noted, however, that there is something circular about this argument - whereby the framework of analysis begins to imprint itself onto history. This thesis hopes to explore the level of unity between two diverse parts of this proposed 'world' by comparing the glass assemblages from Kuwait and Unguja Ukuu. This discussion will test the hypothesis that long-distance trade (including in glass) played an important role in creating a shared material landscape across the region and that this material landscape was integral to the sustenance of the Indian Ocean 'world' in so far as it physically embodied it, but that differences in how glass was used and understood reveal a limit to the level of unity that can be ascribed.

2.2. Methodology

This section establishes a methodology through which the ambitions of the thesis can be achieved. The main sources of data utilised in this thesis are a number of recently excavated, unpublished and previously unstudied archaeological assemblages of vessel glass. These are supplemented, in their analysis and interpretation, by referral to published assemblages from the region.

2.2.1. Site selection and fieldwork methodology

In endeavouring to address the aims and questions raised above, the thesis has chosen to explore material from two regional, maritime contexts - one on the East African coast and the other in the Persian Gulf. The East African material is from the site of Unguja Ukuu, Zanzibar, excavated during the course of this thesis by a team working under the auspices of the Oxford University-based Sealinks Project. The Persian Gulf glass originates from a number of contemporary sites located around the northern part of Kuwait Bay. The Kuwait assemblages were excavated between 2009-2015 by a team from Durham University, of which the present author was an integral part.

These assemblages were chosen partly due to their availability, but also because of their comparable (large) size, quality of excavation, recency of discovery, the fact that they have been unstudied, and also because they represent diverse and poorly understood socio-economic and cultural contexts which fit with the thesis's agenda. The background context to these sites and the fieldwork which led to the excavation of the specific assemblages is summarised in chapters four and five. A full discussion of that fieldwork, along with the necessary raw data, is discussed in great detail in Appendices A and B. It is recommended that the reader consult these appendices alongside the main text.

The Unguja Ukuu material was collected via fieldwork conducted under the auspices of the Sealinks Project, of which the present author was not directly involved. The material in question was almost exclusively collected through excavation, according to a relatively straightforward methodology. The trenches were excavated stratigraphically by the single context method, however larger or more complicated contexts were divided into spits of 0.1 or 0.2m where necessary (recorded with a letter suffix). All of the sediment deposits were either wet or dry sieved using a 3 mm mesh. All vessel glass fragments, no matter how small, were collected and retained. On-site recording was basic; all material-specific finds (that is, all vessel glass etc.) were bagged together by trench and context, but no individual find numbers were assigned in the field.

The Kuwait glass assemblages were collected by the Durham University-based Kadhima Project, of which the author was an integral part. This material originates from a variety of collection methods, mostly from excavation but also from several types of survey as part of a multifaceted fieldwork methodology. Some material was collected through a 'transect survey', whereby the team walked at a spacing of 15m per person collecting all surface finds (pottery, lithics, shell, glass) as they went. Particularly dense concentrations of surface finds or potential structures were given a unique 'locus' number (LC) and subject to a targeted collection of artefactual material. Intensive artefact collections were also made in larger 'pick-up' areas, demarcated in locations of particular interest on the main parts of the occupation either in proximity to structural remains or areas identified as having particularly dense concentrations of surface material (see Kadhima Project 2010: figs. 90, 91 and 92). The vast majority of the vessel glass finds stem from excavation. The excavations were conducted stratigraphically according to the 'single-context' method. In addition, all the excavated earth was passed through a 3 mm sieve (unless otherwise stated). No material was discarded.

The on-site and initial post-excavation finds processing method was a simple one. Each glass fragment was given a consecutive unique 'GL' number and recorded along with all the necessary contextual data.

2.2.2. Glass data selection and recording

In order to achieve the aims stated above, it was deemed necessary to collect a number of types of information from the glass assemblages. These include: first, the numbering and contextual data which would facilitate the interpretation of the assemblages; second, a basic set of descriptive information to act as a reference now and for posterity; third, data permitting quantification of the glass; and, fourth, typological information. These data were recorded in a spreadsheet format, with each row devoted to individual fragments and each column a specific data category. In addition, visual forms of recording were conducted outside the spreadsheet format, namely drawings and photographs. Each of these categories is discussed in greater detail below.

2.2.2.1. Numbering and contextual data

The relevant numbering and contextual data includes the following categories: Glass Number, Small Find Number, Area, Transect, Locus, Pick-up, Trench, Context. It should be noted that some categories are only applicable to the Kuwait material, owing to differences in field collection strategies. Such instances are noted in the relevant sections.

Glass Number

Each fragment was assigned a unique ‘GL’ (glass) number, which functions as the unique identifier for each fragment record. For the Kuwait assemblages the GL number was assigned on-site as part of the post-excavation finds-recording strategy. The Unguja Ukuu assemblage was group-bagged in the field according to find-spot, and thus the GL numbers were assigned by the present author. To distinguish between the Kuwait and Unguja Ukuu GL numbers, the Kuwait fragments are prefixed with the letter ‘K’ (e.g., K-GL1) and the Unguja Ukuu fragments with the letter ‘U’ (e.g., U-GL1). Generally each GL number refers to an individual fragment, expect where two joining or associated fragments found together have been bagged under the same number in the field.

SF number (Kuwait only)

Many of the Kuwait fragments also have a unique ’SF’ (Small find) number, though this data column does not apply to the Unguja Ukuu material. The SF number applies to those fragments excavated in situ (rather than recovered through sieving of spoil, or during survey) for which three-dimensional co-ordinates were recorded, with the coordinates themselves kept in another spreadsheet.

Area (Kuwait only)

This category records the general locality within Kuwait from which a given fragment originates. While it would be possible to infer/extract this information from the remaining find-spot information, it is useful to have this category as it allows for quick identification of how much and what material came from where. The areas in question are labelled as: TR (Transect & locus survey in the Kadhima study region), ABC (Area

ABC excavations), ABC Survey, E (Area E excavations), E Survey, F (Area F excavations), F Survey, NR (Natural Reserve survey), FORT (Fort excavations), MUD Survey (Mudira survey), MUG (Mughaira excavations), MUG Survey (Mughaira survey), BH (Bahra Hushan survey), SH (Shiqaya survey). The background to each of these areas is explored in chapter four and appendix A.

Transect (Kuwait only)

This column records the transect number (e.g., TR101) relevant to fragments collected during the transect survey.

Locus (Kuwait only)

This column records the locus number (e.g., LC101) relevant to material collected from minor sites collected during the survey

Pick-up (Kuwait only)

This column records the pick-up number and area code (e.g., ABC PU 1) relevant to material acquired during targeted artefact collections over parts of the main sites in the Kadhima region.

Trench

This column records the trench number from which a given fragment was excavated. The Kuwaiti trench numbers are prefixed with an EX (e.g., EX10), while the Unguja Ukuu trench numbers are prefixed with the site code UU (e.g., UU10).

Context

This column records the specific context within a trench to which a fragment belongs. The Kuwait context numbers are all unique and were assigned consecutively throughout the project. The Unguja Ukuu context numbers are more complicated. During the initial fieldwork season context numbers were assigned consecutively starting from 001 but were unique only within each trench. In later seasons context numbers were prefixed with the relevant trench number, then rising consecutively within the given trench (e.g., 1401, 1402; 1501, 1502 etc).

2.2.2.2. Descriptive information

Two categories of basic descriptive information were recorded for reference purposes, fragment ID and a summary Description.

ID

This column was used to indicate the part of a vessel (or otherwise) to which a given fragment belongs. The possible categories consist of: Body, Rim & Neck, Base, Misc (Miscellaneous - including subsidiary parts of vessels such as applied decoration, feet and body folds), Adornment (bodily adornments, whether bangles or beads), and Implement (glass implements, such as applicators). Adornments and implements have been identified, but otherwise excluded from this study which focuses solely on vessel glass. Fragments which exhibited the entire vessel profile would have been added as complete, however, this situation did not arise. Those fragments which could conceivably have belonged to body and rim & neck, or body and base were recorded as belonging to rim & neck or base fragments.

Description

A brief and standardised summary of the basic fragment information, as well as any other important features and measurements which could not be adequately recorded within the spreadsheet structure. For the most part the description is kept as short as possible, particularly for the large number of nondescript body fragments. While text descriptions can be a useful means of gaining a quick overview of the material, it is better to avoid recording useful information solely in this format as it becomes hard to analyse upon completion of the data entry.

2.2.2.3. Quantification

Quantification is a much discussed area of artefact studies within archaeology, though this discussion has not always proved entirely productive. Orton & Hughes note that the subject 'has generated more heat than light for many years' (Orton & Hughes 2013: 203), and in truth it has developed little since becoming a subject of theoretical consideration in the 1960s and 1970s. The essential aim of quantification is to measure the amount of material present, allowing for the description of the size of an assemblage and/or the proportional components of which it is composed. In terms of the history of archaeological theory, quantification is very much a feature of the 'New Archaeology'. Although there was nothing new in counting the quantity of objects, it was from this point that the methods became more nuanced, reflexive, and the subject of critique and theorisation (for example, Gifford 1951; Burgh 1959; Egloff 1973; Orton 1975; Glover 1972; Hulthen 1974; Hinton 1977; Orton & Hughes 2013: 22).

One feature of the proliferation of archaeological use of methods of quantification was that it happened almost exclusively within the realm of pottery studies. Quantified analyses of vessel glass assemblages remain exceedingly rare. The most explicit discussions of the role of quantification in vessel glass studies which have made an impact are those of Fletcher & Heyworth (1987), who evaluated several methods in relation to an assemblage of Middle Saxon glass from Southampton, and Cool & Baxter (1996, 1999), who apply a series of methods to an assemblage of glass from Roman Britain. Within the Indian Ocean region, quantified analyses are rare in pottery studies, never mind with regard to vessel glass. Daniel Keller's use of quantified vessel glass data from later 1st millennium Ras al-Khaimah is less explicitly theoretical but shows what can be done with small quantities of material, though he does not have the opportunity to devote much discussion to the potential reliability issues with his data (Keller 2010).

There are a large number of potential quantification methods available, and it is neither possible nor indeed desirable to employ them all in any single study. In this thesis the following methods have been employed.

Count

The most basic method of quantification, simply referring to the number of fragments represented by all the GL numbers. Count is one of the most practical ways of quantifying an assemblage, but it is also among the most problematic. The biggest issue with fragment counts is that they are easily skewed by fragmentation rates, which is in turn dependent on too many independent variables to account for. Levels of fragmentation vary according to vessel form and size, but also due to a myriad of site formation and post-taphonomic processes, meaning that fragment count will have been influenced differently both within and between assemblages thus limiting its value as a comparative measure. This influence extents to such an extent that Orton & Hughes suggest that fragmentation rates have more influence on fragment count than initial quantity (Orton & Hughes 2013: 207).

Weight

Fragment weight was recorded in grams (g) to a precision of 0.01 grams using a digital scale accurate to 0.01 grams. Weight is a useful as a comparative measure as it is quick, and in that it avoids the problem of variable fragmentation rates between contexts and assemblages (Orton & Hughes 2013: 207). However, it is important to remember that heavier vessel forms will be over-represented, making it difficult to use weight alone to compare the proportion of say, a large and heavy vessel to a small and light one, within an assemblage (Fletcher & Heyworth 1987: 36; Orton & Hughes 2013:

207). Weight actually offers a useful means of assessing relative fragmentation rates between contexts and assemblages, as when divided by number of fragments (that is, fragment count) it gives a measure of average weight per fragment (Fletcher & Heyworth 1987: 36). This can then be taken as a relative proxy for fragmentation rates, and can be incredibly informative when trying to understand stratigraphy etc. This measure of fragmentation particularly useful when compared with a similar approach to estimated surface area (see below).

Thickness

Thickness was measured to a precision of 0.1 mm using a pair of plastic digital callipers. Although quick to carry out, thickness presents a surprisingly frustrating conundrum in that few fragments are of a uniform thickness, and some vary considerably. Measurements were made over the most representative part, as taking the narrowest or thickest point could produce results so misleading to the point that they were utterly unrepresentative of anything significant. Thickness seems to be taken as a standard measurement, and is of value in understanding the physical characteristics of a particular vessel or type, but is in fact not overly useful in terms of quantifying an assemblage overall.

Estimated Surface Area

Estimated surface area (ESA) is a means of quickly measuring the size of a fragment. ESA is measured by resting the fragment on millimetre-squared graph paper and recording the area to a precision of 25 mm^2, with smaller fragments measured to 5 and 10 mm^2. This method is obviously not a perfect measure of size, but holds some advantages over the other standard approaches to this issue, particularly measuring length and width. First of all, it is much faster, an important consideration when thousands of fragments need to be measured. Second, the measure is more accurate than measuring length and width, as the latter is prone to bias resulting from the irregular manner in which glass is prone to shatter. Third, the area of a fragment relates to the functioning capacity of a vessel, regardless of thickness. Finally, the method results in a useful and comparable figure (given in mm^2), which is advantageous over the two figures given by the length and width method (and more accurate than anything produced by multiplying those two figures).

Rim diameter

Rim diameter was measured using a rim chart with concentric markings every 10 mm. While not a means of quantifying the assemblage overall, this measure gives an important indication of the range of rim sizes within specific types.

Base diameter

Base diameters were recorded using a slightly different methodology to that used for the rims. Bases are slightly more problematic to measure than rims as they rarely have a definitive edge to use for the measurement, and in many cases only the central portion or edge of the base fragment will survive, meaning the profile is insufficiently complete to make a measurement. The best approach, and the one that was employed herein, is to measure the radius from the centre point of the base to the edge of the point where it makes contact with a surface when at rest, then doubling this figure to get the diameter. This can then be checked using a rim chart, where possible. It is worth noting that there is a difference in this approach between base diameter and maximum vessel diameter, with base diameter restricted to the part of the vessel in contact with the surface.

Estimating vessel numbers

There are a number of methods of calculating the number of vessels represented by an assemblage. The best approach is to spend time 'refitting' as many fragments as possible, then adding to this non-joining fragments which are clearly of the same vessel. This method, however, is far from practical, the equivalent of attempting a jigsaw with thousands of pieces, of which the vast majority are missing. With glass this method is almost impossible (Orton & Hughes 2013: 207). Quicker methods involve using estimates, such as rim EVEs, where the proportion of a complete rim represented by a given fragment is estimated to the nearest 5%. EVEs work on the principle that each fragment represents a portion of a complete vessel, and that by measuring these portions and calculating the sum according to type it should be possible to estimate the number of vessels which make up the assemblage. In theory, EVEs are the least biased method of quantification as they are not affected by levels of fragmentation (Orton & Hughes 2013: 207), but in practical terms can be difficult to measure. A bigger problem is that EVEs tend to give an underestimate of vessel numbers, as they lump together fragments which may be of the same type and same diameter but can clearly be seen to be from different vessels on observation.

As an alternative to EVEs, Cool & Baxter developed a method whereby known vessel types were divided into a number of profile zones, normally 5 or 7 depending on whether a closed or open form was concerned, with each zone given an equal score (Cool & Baxter 1996: 97). Fragments would then be given a score based on the number of profile zones they covered, with a complete profile giving an EVE of 100. Again the theoretical value of this method eclipses its practicality. The problem here is that this method needs a perfect knowledge of the vessel types which make up an assemblage - something we do not have for the Early Islamic glass tradition. Furthermore, some fragments, indeed the majority of fragments in typical archaeological glass assemblages, are simply too fragmentary to assign to a vessel type.

Another method, and that which was adopted herein, is to rely on subjective assessment of the rim fragments, lumping together all the fragments that could be from the same vessel (Fletcher & Heyworth 1987: 37). Although time consuming, this method offers a reasonable return on resources if concentrated on rim types alone, but would be impossible within the time available for the whole assemblage (and indeed offer diminishing returns). There are of course problems with this approach, most notably that it is subjective, and thus the results are neither testable nor entirely repeatable. That said, it does avoid problems with underestimation that dog EVEs and other measures of vessel quantification (Fletcher & Heyworth 1987: 37). The fragments considered to belong to the same vessel are noted in the '*description*' column.

Altogether, the best approach to quantification is to employ multiple measures, and it is regularly stated that several methods used together will be of more value than any one when applied in isolation (Orton & Hughes 2013: 22; Solheim 1960; Bradley & Fulford 1980; Orton 1985; Schiffer 1987: 282). Other than the biases inherent in the methods, it is important to be aware of a number of other potential issues. First it should be remembered that excavations, no matter how careful or extensive, can never recover all of an archaeological assemblage. Second, only a small portion of the original quantity of material will survive into the archaeological record in the first place. Third, with glass there is the problem of recycling, and the potential that some, even a lot of the original material has been collected and removed post-breakage (Cool and Baxter 1999: 74). Estimating the degree to which this might have happened is near impossible, and will differ within and between sites, as well as between types. Indeed, certain forms, perhaps those with thicker walls which break into larger fragments, will be more easily collected for recycling, leaving a bias towards more fragmentary vessels.

2.2.2.4. Typology

The need for a typology specific to Early Islamic glass was raised in Chapter One, where it was identified as the most damaging factor holding back current understanding of vessel function, chronology and provenience (see §1.2.5). In thinking about how to create a typological system, it is worth considering past critiques of various systems, as well as how others have approached the creation of typologies. In particular, it is informative to consider typological treatments of other glass traditions - particularly Roman material.

There are many possible approaches to creating a typology, and many pitfalls inherent in the process. As long ago as 1956, Shepard critiqued the obsession with 'types' (Shepard 1956: 306-17), particularly for its false impression of being 'natural', its rigidity and its impractically. There is also the problem of subjectivity, in that no two typological systems will be the same (Orton & Hughes 2013: 84). That said, while imperfect, there remains a space for typological studies in archaeology. In many ways they are the least bad approach for dealing with issues of similarity and diversity within groups of material culture in a quantifiable way.

Roman specialists have taken the lead in terms of typological treatments of vessel glass. For example, Price & Cottam's overview of Romano-British glass was intended as a handbook for specialists and non-specialists alike, formalising received categories according to a relatively traditional approach (1998). An excellent contribution though the book is, there is still relatively little discussion of the methodological approach to typology creation specific to vessel glass. In fact, of the few detailed typologies of Roman glass that are in existence, it is Isings' early, and highly traditional contribution that is still the most regularly used by Roman glass scholars as a whole (Isings 1957). Recently, more adventurous 'functional' typological systems of Roman glass have sought to assign fragments to categories based on their function as much as variation in shape, such as drinking vessels, tablewares, storage vessels et cetera. This approach, as followed by Cool & Baxter (1996; 1999), offers a more interpretative approach which encourages consideration of how the artefacts were used in daily life. The primary result of these typologies, while not perfect, is that the Roman glass tradition can be discussed much more easily using a common and well established language, and that the material is better recognised in general, particularly even by non-specialist archaeologists.

Unfortunately the Early Islamic glass tradition has no comparable tradition of explicit typologisation for this thesis to fall back on. Lamm's early work on the limited assemblage from the caliphal palace at Samara has been relied upon far too much considering its date and summary nature (1928). Subsequent publications of relevant material from individual sites have tended to selectively draw upon previous typological approaches and introduce novel categorisations and terms, meaning that there is a considerable amount of confusion in terms of categories and terminologies between most publications. The issue here is not the existence of site specific typologies - indeed this is the only option in the absence of a dominant, explicit approach. Rather, it is the fact that there is little explanation of the thinking or methodology behind these typologies, whether in terms of the origin or intended meaning of the adopted terms, the basis of categorisation (and indeed the use of more than one, often contradictory approach within the same typological system), and their relation to other terminology and categories at different sites.

Before setting out the methodology behind the typology adopted within this thesis, it is worth looking at the various methods traditionally adopted in this regard. The exact methods employed normally depend on, among other things, the aims of research and the nature of the data, with an emphasis on the latter. Normally typologies are based on a diagnostic but variable feature that most of the assemblage shares. A common option is vessel profile, however with glass it generally is not possible to assign small fragments to specific vessel shapes (Orton & Hughes 2013: 190). This is the kind of approach employed by Isings (1957) and later Price & Cottam (1998). Rim types are generally considered a more practical option, however this means limiting typological classification to a small portion of the assemblage. Furthermore, the same rim type may be associated with a number of different forms, so it is important to be cautious when using rim fragments as a proxy for certain forms (Orton & Hughes 2013: 190).

We have seen above how Cool & Baxter (2006; 2009) employed function as the primary basis of their typologisation. The problem with this approach is that not only is the association of vessel types (which, remember, are likely to have been identified by small fragments) with functional activities highly subjective, but it also imposes modern concepts onto the past and disregards the likely reality that many vessels were used for multiple purposes throughout their lifetime. Finally, as Orton & Hughes point out, just because one identifies a vessel of a certain functional category at a site does not mean that that activity was carried out (Orton & Hughes 2013: 81-2). It is also worth mentioning that a typology need not be hierarchical in structure. In other words, there is no reason why one fragment cannot belong to different categories defined on different bases, such as one by form and another by technique or decorative style.

What then of the typological approach adopted within this thesis? Taking the above approaches (and their limitations) on board, the glass from Unguja Ukuu and Kuwait is categorised according to a tripartite approach based on Form, Type and Decoration. The aim was to categorise and summarise the range of data in a way that facilitated analysis and an understanding of the kind of vessels present in the assemblages without falling into the trap of assigning small fragments to specific vessel types which come heavily laden with functional connotations. Inevitably the system employed is far from perfect, however it has the advantage of being descriptive, transferable, semi-hierarchical and leaves space for additions and updates.

Form

This category refers to the general shape of vessel to which a fragment belongs, whether 'undiagnostic', 'closed', 'open' or 'semi-open'. 'Closed' vessels are those in which the mouth and neck of the vessel are significantly restricted in diameter compared to the vessel body, such as might be termed elsewhere by the more heavily leaden terms of bottle or flask. 'Open' vessels are those where the mouth is unrestricted or wider than the main body diameter, and includes the range of vessels often considered as bowls, beakers, cups and plates etc. 'Semi-open' vessels are those which fall in the awkward 'grey-area' in between, perhaps with necks and mouths which are slightly narrower than the main body, but not so restrictive as the 'closed' vessels. In theory it should be possible to assign most fragments to a specific form, general as they are. In practice, however, it proved all but impossible to assign the vast majority of body fragments to anything other than 'undiagnostic' as they were too fragmentary and generally nondescript. Base fragments also proved a problem. While the smaller examples certainly belonged to closed forms, there is no clear point at which open forms begin. Furthermore, not all large bases belong to open forms. In the end, closed, open and semi-open forms were almost exclusively determined by fragments belonging to the rim & neck 'ID' category, while base fragments were assigned to a relevant base form.

Type

This category indicates a more precise level of categorisation for the individual fragment based on its definitive features, falling within a particular 'form'. It is a categorisation of the fragment itself, not the overall vessel to which it belongs. Indeed, fragments of the same type may, and indeed likely do, belong to different vessel categories. Based on partial fragments alone, such assignation cannot easily be determined. Fragment type is the basis of how the catalogue organised, and is the most narrowly defined of all the typology data categories. It is, however, non-hierarchical in the sense that a single fragment could, in theory, belong to multiple type categories (for example, a complete profile would exhibit a base type and a rim type), though in practice this eventuality never presented itself. In the majority of cases (with body fragments) it was not possible to assign a 'type', in which case the letter U was used. Each of the types is defined in turn in Chapter Three.

Decoration

This category specifies whether and how a fragment has bee n decorated, with the relevant techniques discussed within Chapter Three.

Each of these variables was recorded in a specific column in the database. The practical process by which the various *Forms* and *Types* were identified involved setting out the individual fragments on a large table and organising them into groups based on similarities in their physical attributes and shape. This process took a considerable amount of time and was carried out on a number of different occasions, in order to refine the types further and further, and to take on board advice from others such as St. John Simpson of the British Museum. Discussions with my supervisory team and others were used to inform the reliability of each type, acting as a forum of debate in which decisions whether to lump or split individual types could be taken with some degree of oversight. Ultimately, like any typology, this was a subjective process which produced subjective results. However, the resulting typology, presented in Chapter Three, is at least available for critique, as is the methodology set out above.

2.2.2.5. Colour and weathering

Most approaches to recording colour are summary and *ad hoc*, with exceptions including Kolbas's attempt at 'a colour chronology of Islamic glass' (Kolbas 1983). There are however so many problems with recording colour that highly precise approaches may not be all that desirable. To understand what colour *means*, it must first be remembered that colour results from the eye's reception of different wavelengths of light, which may in turn be influenced by the refractive and reflective qualities of glass, as well as the differential absorption rates of certain wavelengths by particular pigments. With opaque and inert objects, colour can be measured more or less straight forwardly. Glass, however, is particularly problematic for a number of reasons. First, glass ranges from transparent when colourless, through a wide range of translucent shades, and can even be opaque. The ratio of translucency to opacity influences the transmission of light through the glass, resulting in varying degrees of refraction and reflection of light thus altering colour. The thicker a fragment of glass the more the light will be affected by this transmission, normally appearing darker. It is demonstrable that thicker fragments from the same vessel will appear darker than thin fragments, indeed this is even demonstrable on the same fragment. There is also the issue of weathering (discussed further below). Weathering can result in a surface crust which can obscure the colour of a fragment, but it can also change its appearance. In some cases, microscopic layers of weathering can create iridescent sheens. Thus, with weathering, whether visible or not, the colour of glass can change over time. One also must consider the conditions of analysis. Different colours and strengths of light will result in different colours.

There is also the issue of how to describe colour. The convention within the discipline is to use fairly nondescript terminology, for example, light green, light blue *et cetera*. This has the advantage of being efficient and giving a general impression of the appearance of a fragment but fails to capture the sheer range of colours. Another option is to use a Munsell chart, giving a high level of precision and standardisation in terminology. However, owing to the number of factors which have been noted as influencing colour, and indeed the many colours which may appear on a single vessel or even fragment, a precise method such as the Munsell chart offers may give a false impression of accuracy and indeed be no more desirable. The final issue is of subjectivity. It is perhaps most clear in the world of colour identification that no two people see things in the same way, even under controlled conditions.

As a result of these issues, this thesis opted for a fairly basic system of colour identification which aimed to seek out similar groups rather than distinguish individual fragments. Another main factor in adopting this method was time. With over 5,500 fragments to record it simply was not feasible to view each in a light box and use a Munsell chart to identify colour, especially in the field where time pressure was paramount. The adopted method involved organising the fragments from the individual assemblages into colour or metal groups, some of which were later joined together.

This procedure was carried out in natural light, but diffuse rather than direct. As a result, the following colour categories were defined.

LGB

'Light green-blue' glass. Naturally-coloured and by far the most dominant group. Appears in a large ranges of shades and hues reflecting different thicknesses, levels of weathering and erosion, and presumably variability in chemistry.

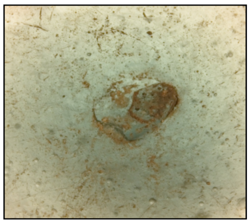
EG

Bright 'emerald green' glass. Thought to be naturally-coloured, but with a particularly vibrant shade of green. Many of the fragments included in this category may represent heavily eroded 'modern' fragments (that is, mid-20th century and later).

OG

'Olive green' glass. A combination of green and yellow hues, with little or no blues, often appearing quite pale. Likely to be naturally-coloured.

IB



'Ice-blue' glass. Pale blue glass, almost colourless, with no green hues. Very smooth texture. Tends to weather to flaky layers of iridescent whites, blacks and greys. Clearly distinct from the other glass colour groups. Probably deliberately decoloured.

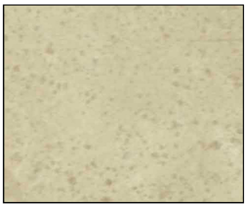
BL

'Blue' glass. Deliberately coloured, presumably with the addition of cobalt or copper. Weathers to a dark, almost opaque appearance in the thicker cases.

TQ

'Turquoise' glass. Includes a range of turquoise colours in which blue and green dominate. Almost always bright and vibrant. Deliberately coloured.

CL



'Colourless' glass. While considered colourless, often appears with very faint tinges of green, yellow and even pink. Weathering patterns alter the passage of light through such fragments giving the impression of faintly coloured glass in some cases. Pink hues may result from sun exposure. Deliberately decoloured. Possible addition of manganese and antimony.

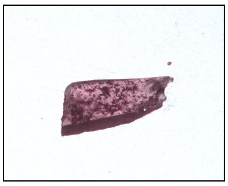
M

Modern glass. This group includes glass in a number of different colours, including 'brown', 'apple-green' and 'colourless'. Observation of the colour, surface texture, metal, and manufacturing technique allows the identification of this glass as modern, that is, 20th century and later.

BK

Black glass. A rare type. Dark, matt and opaque in nature.

PK



Pink glass. A rare type. Deliberate and homogenous colouration. To be distinguished from those instances of a pink tinge or streak as sometimes found in otherwise colourless glass.

RD

Red glass. A rare type. Claret to ruby in colour.

Some degree of weathering is present on almost all ancient glass. Weathering is no more than the corrosion of the glass metal. The exact type of weathering that appears can depend on the chemical composition of the glass metal but also the burial environment and the conditions to which it was exposed. Removal of weathering is in fact removal of the glass surface. Often glass which has been exposed to the elements at surface level will possess less weathering. Rather than being less corroded, it is more likely that such fragments have had their weathering crust eroded away. Not only does weathering have consequences for the integrity of the glass, as discussed above weathering can obscure and alter the colour of a vessel. As such, weathered glass was labelled '*C*' in the database.

2.2.2.6. Drawing and photography

Visual forms of recording, namely drawing and photography, were also conducted. 'Drawing number' and 'photograph number' columns were included in the spreadsheet, allowing a link between the spreadsheet, the original drawings and the folders containing the digitised drawings and the photographs. Obviously not all fragments were drawn or photographed, with the selection criteria restricted to those which were diagnostic. Almost all diagnostic fragments were drawn, with the exception of those which were too small or distorted to convey the required information.

All drawings were made at 1:1 scale according to standard finds drawing techniques and methods of presentation. Each drawing was labelled with a unique drawing number, its glass number and key contextual information. The drawings were then scanned and digitised.

The photographs were taken with the assistance of Jeff Veitch, Durham University Archaeology Department's resident professional photographer, using a Nikon D200 camera. The camera was mounted above the artefacts, with lighting from above diffused using drafting film. Light was also shone from below, with artefacts placed on a pane of glass, lined again with drafting film. The RAW and JPEG files were labelled with the relevant fragment glass number.

2.2.3. Published sources

The published data was intended to be exploited as a subsidiary resource to inform the analysis and interpretation of the unpublished material, as well as to offer new insights into that published material itself. As such, data selection for the published sections was a selective process, restricted to sites from the Persian Gulf and East African regions which were: a) broadly contemporary with the unpublished data from Kuwait and Unguja Ukuu; b) substantial in terms of quantity; and c) published to a good standard.

This latter criterion requires a consideration of a number of issues with published glass sources which limit their potential utility. For a start, vessel glass publications come in a variety of formats and present different approaches, including material-specific finds reports focused on material from a single site (often as part of a traditional archaeological ‘site report’), synthetic articles of material from multiple sites (often discussing a particular stylistic tradition, technique or form), and as catalogues of museum and private collections. As a result, the data which is recorded and presented can vary widely, reflecting the different research traditions of the disciplines (from the art historian to the archaeologist), different sources of material (from excavations to the art market) as well as different aims and intended audiences. One particularly troubling outcome of all this diversity is that comparison of published data can be complicated, even impossible.

Another problem is that some of the most important material remains unpublished or has been published a long time ago. Indeed most of the published sources are quite old, with very few published within the last decade. As a result of these issues, when choosing which published sources to work with this thesis adopts a dual strategy. When researching the background context to the forms and types defined in the typology (chapter three), all the published vessel glass assemblages available were considered so as to include as broad a range of data as possible. However, when comparing the results of the analysis of the unpublished assemblages with published material in chapter six, comparisons were restricted to archaeological assemblages published with a good degree of detail.

A final issue relates to what degree of reliability can be ascribed to the information garnered from published sources, whether interpretations of the form or function of a given object, its provenance, or - perhaps most importantly - its date. Certain issues with dating are obvious and easy to take into account, especially where subsequent publications have corrected for them. More difficult are controversial dates, upon which different members of the archaeological community may disagree. In such cases, it is simply not possible within the time available to fully interrogate every piece of dating evidence. This would require several theses in itself. As such, the thesis does its best to correct for such dates where possible, or to highlight issues of controversy and debate. That said, for the most part it is necessary to work with the received dating available in each case.

In general, finding parallels is a difficult and time-consuming endeavour, the main difficulties of which have been discussed by Meyer (1996: 249, 251). For some ‘generic’ types, the problem is in deciding which parallels are significant and which are coincidental. For other unique fragments either there is a glut of references, creating an imbalance in regard to other types, or long searches can prove fruitless. Bases provide a particular problem, with many glass reports failing to include such fragments. The task is particularly difficult when based upon line drawings alone. As such, efforts were made to search a wide and comprehensive selection of the literature when attempting to identify parallels. The focus was on identifying useful and seemingly significant links, particularly where dating evidence was available. Where less reliable parallels were the only evidence on offer, the degree of their significance is noted.

2.3. Chapter Summary

This chapter began by establishing an explicit set of research aims for the thesis to address, based on the issues raised in Chapter One. It proceeded to outline a data collection methodology which will provide the necessary information for the aforementioned aims to be achieved. This mainly focused on the recording of contextual data, methods of quantification and the outline of a procedure for the construction of a typology. In the following three chapters, the data collected through this process is set out and analysed. Following this, Chapter Six will return to discuss how the relevant outcomes of this analysis relate to the aims outlined above.

Chapter Three

Typology of the Glass From Kuwait and Unguja Ukuu

This chapter presents the majority of the data which will be used to address the first of the key aims identified in Chapters One and Two, specifically the aspiration of gaining a better understanding of the typological components of the Early Islamic glass tradition. The particular perspective promoted earlier in this thesis is one that is firmly archaeological in nature, that is, in direct contrast to the dominance of art-historical museum and private collection-led perspectives on the Early Islamic glass tradition. As such, Chapter Three presents a typology of the vessel glass from two main archaeological assemblages, those from several related sites in Kuwait and that from Unguja Ukuu, Zanzibar. By addressing two previously unstudied bodies of material, this thesis not only introduces new material into the discipline, but also avoids the methodological constraints imposed when working with material that has already been studied and published.

The approach of this chapter is to define sets of components from which the Early Islamic glass tradition is composed, rather than to attempt a holist hierarchical typology based on complete vessel forms. As such, the chapter proceeds by breaking vessels down into their diagnostic elements. It first considers the rim and neck forms, dividing these into 'closed', 'semi-open' and 'open' types. The chapter then proceeds to consider the base forms, before turning to the miscellaneous vessel parts and, finally, to categorise the decorative techniques. It is worth reiterating the point made in previous chapter that there is to be no hierarchy of types, and indeed several may be found on the same vessel.

An extensive search of the existing literature has allowed the identification of external parallels for this material, giving an idea of the types' distribution and chronological range. By virtue of their presence in the Kuwaiti and/or Unguja Ukuu assemblages, these types can also be provisionally dated to the Early Islamic period. As is discussed later in the thesis, the Kuwaiti sites date from the mid to late 7th through the 8th century AD (with the exception of Shiqaya, which is occupied into the 9th century), while the Unguja Ukuu sequence is more broadly dated from the 7th to 9th century AD. At present this is the 'safe' limit of precision to which these types can be dated. However, following a close study of the intra-site distribution of the types in Chapters Four and Five, Chapter Six will return to evaluate the dating potential of the various types discussed herein (§6.2.2).

3.1. Closed & Semi-Open Rim Types

3.1.1. Folded and flattened rims

Folded and flattened rims are here defined according to the presence of cylindrical necks in combination with distinctive 'T-shaped' rim profiles (Fig. 3.1, 3.2, 3.3, 3.4). The glassworker presumably achieved this shape by first folding the unfinished neck outwards, then folding it a second time back over on itself, leaving a strong protruding flange. The folded rims were normally flattened by marvering, reflecting the ideal of achieving a level, horizontal head. In plan the *folded and flattened rim* heads are circular or sub-circular in shape, with roughly central circular or sub-circular mouths. The associated necks are straight-sided in profile and cylindrical in plan. Twenty-two *folded and flattened rims* were found in Kuwait, with another 11 at Unguja Ukuu.

	Kuwait	**Unguja Ukuu**
No. Fragments	22	11
Rim Diameter (ave.)	28.3 mm	28.6 mm
Neck Diameter (ave.)	18.42 mm	19 mm
Mouth Diameter (ave.)	11.42 mm	12.5 mm
'T' shaped (qty.)	16	11
'Mushroom' shaped (qty.)	6	0
Oval mouth	9	5
Circular mouth	10	4

FIG. 3.1. SUMMARY OF THE DIMENSIONS OF *FOLDED AND FLATTENED RIMS*

In terms of dimensions (Fig. 3.1), the Kuwaiti *folded and flattened rims* range from 20-30 mm in diameter with a tendency towards the greater figure (ave. 28.3 mm), while the necks range between 15-20 mm diameter (ave. 18.42 mm) and the mouths 8-15 mm across (ave. 11.42 mm). The Unguja Ukuu examples range in rim diameter from 20-35 mm (ave. 28.6 mm), with neck diameters from 13-25 mm (ave. 19 mm) and internal mouth diameters from 9-15 mm (ave. 12.5 mm). There appears to be a positive correlation between rim, neck and mouth diameter.

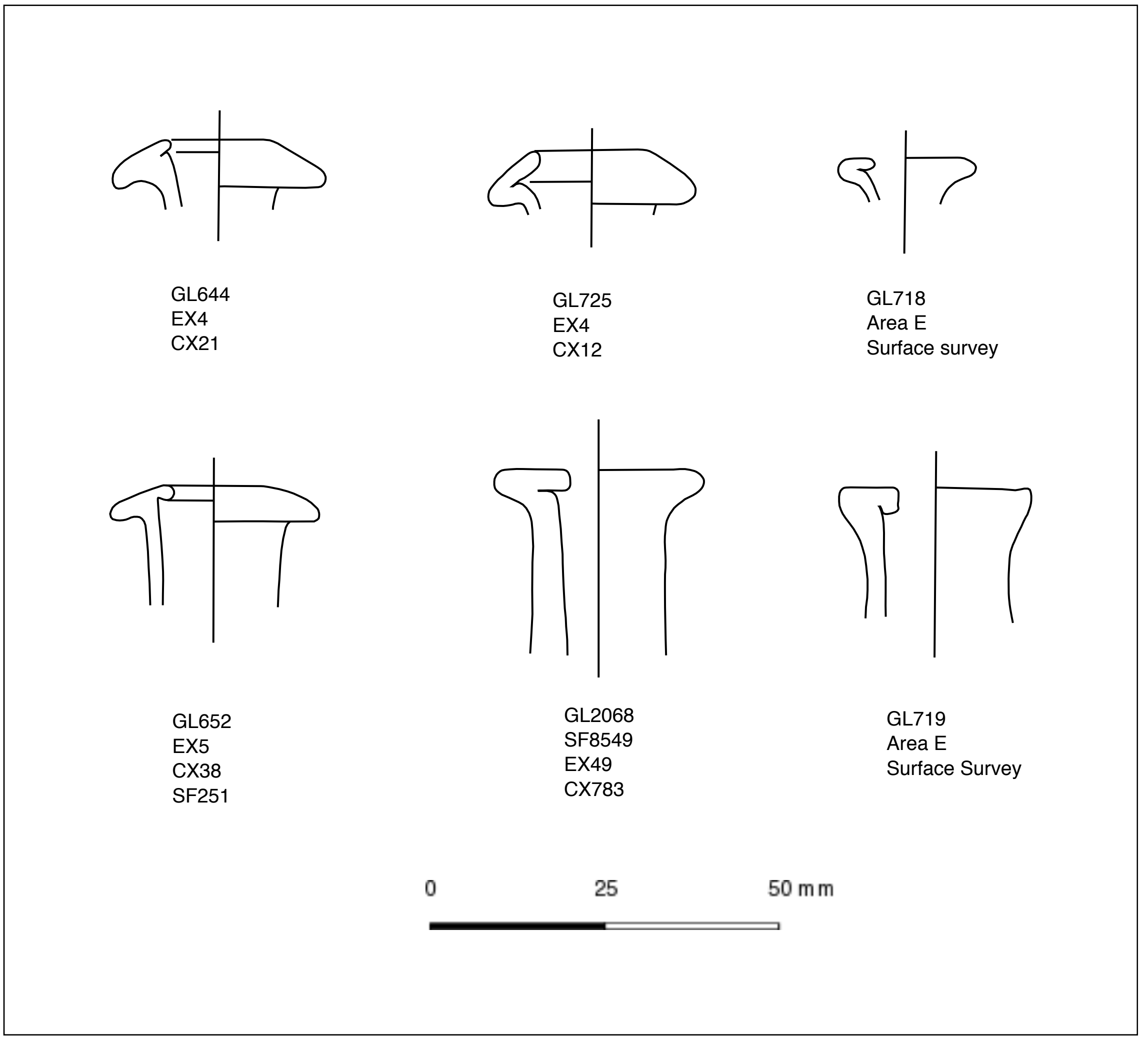


FIG. 3.2. FOLDED AND FLATTENED RIMS FROM KUWAIT

Although the perfectly flattened ‘T-shaped’ rim profile is presumed to represent an ideal manifestation of this type in actual fact many examples are either imperfectly flattened, lop-sided or sloping, sometimes resulting in a ‘mushroom-shaped’ profile. The majority of the Kuwaiti rims have ‘T-shaped’ profiles (16 fr.) as opposed to ‘mushroom-shaped’ varieties (6 fr.), whereas all of the folded and flattened rims from Unguja Ukuu are ‘T-shaped’. Mushroom-shaped rims tend to be slightly larger on average than ’T-shaped' rims in regard to rim and mouth diameter. Interestingly, this correlation does not extend to neck diameter, meaning that mushroom-shaped rims have slightly smaller necks in relation to rim diameter. It is unclear whether these variations are significant, in terms of chronology or provenience, or simply reflect an accepted range of variability in the end product. As there are many fragments which bridge the gap between ‘T’ and ‘mushroom’ profiles, it seems more likely that the latter scenario better reflects reality, and indeed some level of variability is to be expected when a large number of producers are working in pursuit of a common idea.

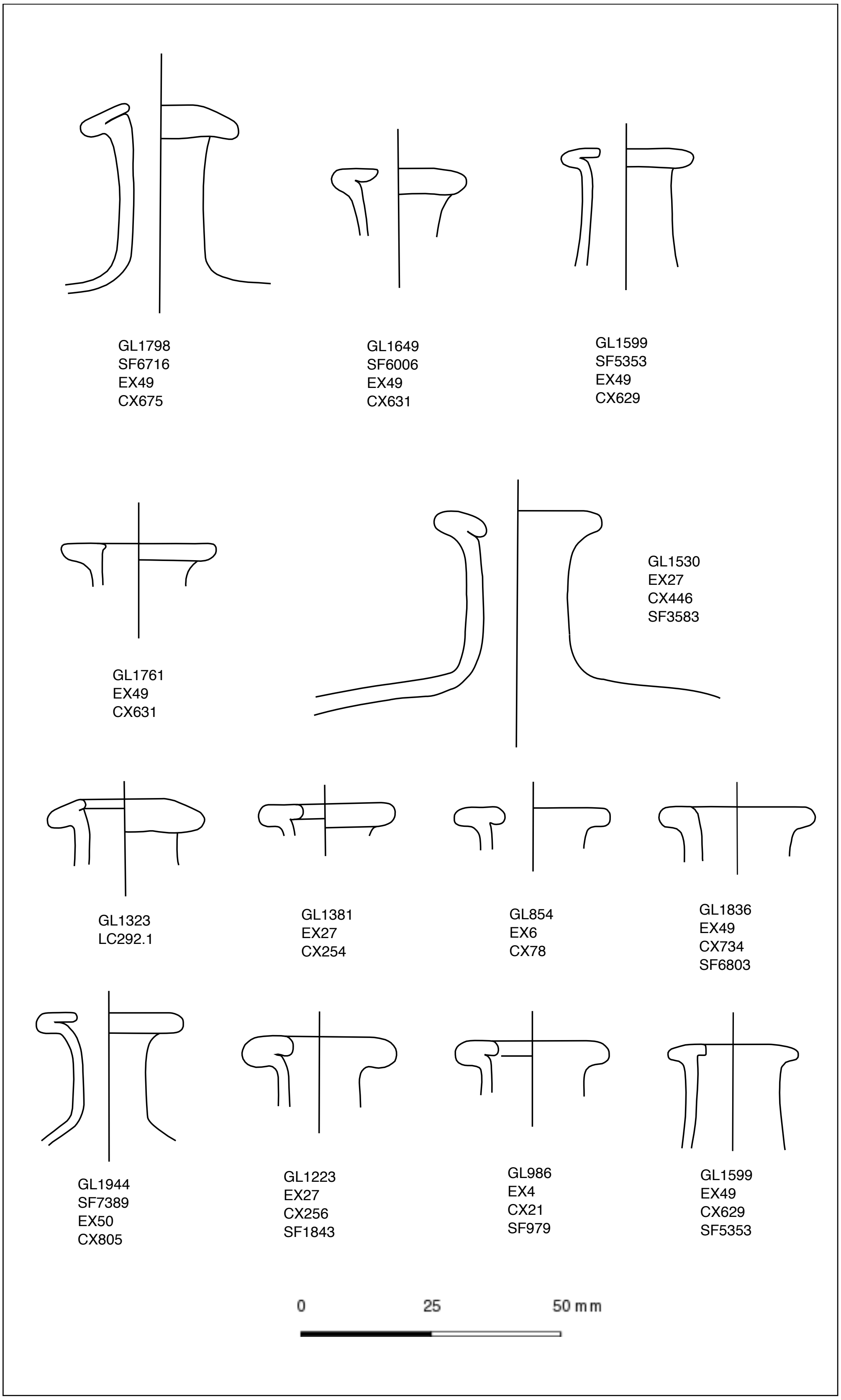


FIG. 3.3. FOLDED AND FLATTENED RIMS FROM KUWAIT

Folded and flattened rims often exhibit certain irregularities. A number of vessels are slightly lopsided or possess irregularly-shaped or off-centre mouths. Within the Kuwaiti material, roughly comparable numbers of oval (9 fr.) and circular (10 fr.) mouth shapes were recorded, while at Unguja Ukuu slightly more oval (5 fr.) than circular (4 fr.) mouth shapes where identifiable. There does not seem to be any correlation between mouth shape and rim diameter. Regarding the other irregularities, K-GL1944 possesses a rim of irregular thickness, while K-GL361 is particularly irregular. K-GL1530 combines an off-centre mouth with a rim that extends further on one side giving a lopsided effect.

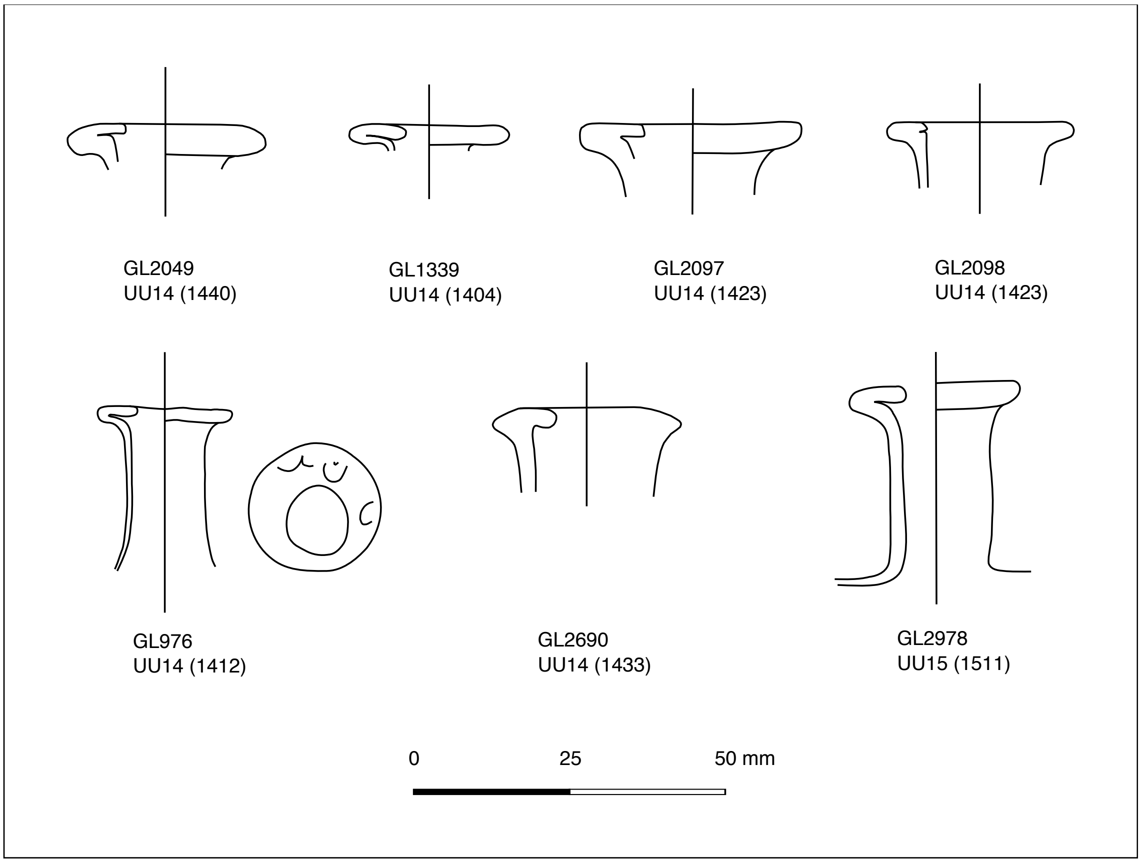


FIG. 3.4. FOLDED AND FLATTENED RIMS FROM UNGUJA UKUU

Almost every fragment shows some sign of irregularity or imperfection to the point that these are the norm. K-GL1836 is badly distorted, but in this case this appears to have resulted from exposure to a high heat post-deposition rather than at the manufacturing stage. Interestingly, in addition to the lack of sloppy 'mushroom-shaped' rim profiles, there seem to be less irregularities within the folded and flattened rims from Unguja Ukuu than seen in the Kuwaiti assemblage, with the majority well finished.

The *folded and flattened rims* are almost invariably produced in natural LGB glass of a basic quality. Furthermore, they are rarely decorated nor embellished in any way. That said, one example from Unguja Ukuu, U-GL976, may even exhibit a crude Arabic inscription, though it is illegible and may well just represent a suggestive but coincidental organisation of weathered cracks.

Folded and flattened rims, particularly in association with the globular bottle form, have a wide spatial and chronological distribution, extending deep into the Roman period yet also as late as the 11th-12th centuries AD. In an eastern Mediterranean context, Ayala Lester points out that such rim forms are "consistent with that of late Roman jugs and cylindrical bottles" (Lester 2003: 158; Barag 1970), while at the Red Sea site of Myos Hormos/Quseir al-Qadim, *folded and flattened rim* types can be found in both the Roman and Mamluk occupation levels (Meyer 1992: nos. 172-89 [Roman], nos. 396-8 [Mamluk]). A similar pattern is also true of the Persian Gulf, with *folded and flattened rims* appearing at Early Historic ed-Dur (Whitehouse 1998: nos. 68-70). This long chronological spread is the basis of Hadad's assertion that *folded and flattened rims* cannot be dated in isolation, but only with reference to their associated assemblage and find-spot (Lester 2003: 160; Hadad 1998: 1, 92). That said, there is an abundance of evidence demonstrating the use and distribution of folded and flattened rims within the 7th-10th centuries AD.

In the Syro-Palestinian region, Lester presents many varieties of globular vessels with *folded and flattened rims* from the Umayyad to Late Abbasid strata (AD 650-980) at Tiberius (Lester 2003: 158-60, figs. 1, 3-8), as well as 7th-8th century contexts at Jericho (Lester 2003: 159; Barag 1970a; 1, 51-2), 8th century AD Kursi (Barag 1983: 37-8, fig. 9.5), and Umayyad Bet Shean (Hadad 1998: 2, pl. 7.11). In Egypt, a mushroom-shaped version of a *folded and flattened rim* is present in a late 8th century context at Fustat (Scanlon & Pinder-Wilson 2001: 31, 33, fig. 11a). In Iraq, they are found in Seleucia (Negro Ponzi 1970-71: fig. 49, nos. 1-2), Samara (Lamm 1928: 18, abb. 9, nr. 33), and Ctesiphon (Negro Ponzi 1984) - though these contexts are poorly dated. In Iran, unpublished examples are present at Siraf (Jennings n.d.), with other examples insecurely dated to '9th-10th' century layers at Susa (Kervran 1984) and Nishapur (Kroger 1995: 71-2, nos. 89-90). In East Africa, they are noted in late 1st millennium AD contexts from Shanga (Horton 1996b), Kilwa (Chittick 1974: 406, fig. 158ij), and in Juma's earlier excavations at Unguja Ukuu (Juma 2004: 123, 126, fig. 7.1.2., nos. 1-3 and 8, pls. 2-3 and 5). A feature of this distribution is that while *folded and flattened rims* are a common occurrence at sites within the central Islamic lands, they are less common further afield. This distribution pattern can perhaps be explained by the hypothesised low-cost and domestic function of the forms; factors unlikely to lead to their inclusion in longer-distance exchange networks, at least on a commercial level.

At many of the sites listed above, *folded and flattened rims* are associated with expansive, globular body forms, although squat and piriform varieties are not unknown. These globular vessels are free blown, come in a range of sizes, and are normally associated with thick push-up bases. Such vessels were undoubtedly expected to hold regularly-used liquids such as oil or wine in moderate quantities (thus nothing too precious), with the folded rim serving as a strong flange allowing for the secure tying of a cloth or solid stopper in place. One can imagine such items being frequently used and reused for various purposes within a general domestic storage context. The lack of decoration and near exclusive use of naturally-coloured glass for *folded and flattened rims*, along with the regular presence of superficial imperfections such as those outlined above, indicates an emphasis on low-cost, high-speed production, and thus a low value cost at source. Such insights, when combined with proposed function, further indicates that vessels with folded and flattened rims were fairly ubiquitous utilitarian items, intended for mass-consumption in domestic contexts, their low cost making breakage less of a concern than with more elaborate vessels.

Lester has argued that the degree of imperfections or irregularities in such vessels increases with time, specifically from the Umayyad to Abbasid periods, however this is far from proven (Lester 2003: 158-60). If true, the implication is of a process of progressive de-standardisation while maintaining the integrity of expected function and overall form. One reason for this process might be an increasing emphasis on speed of production, perhaps reflecting greater demand as the number of consumers expanded with the economy, or alternatively pressure on profit margins. Indeed both scenarios fit together; if there was higher demand and the number of glass workers increased significantly into the Abbasid period (as suggested by Stargardt 2014), then decreased profit margins might have been an issue at the lower end of the market. While somewhat conjectural, both theories fit with the presumed economic, demographic and cultural trends which are considered to mark the early Abbasid caliphate.

3.1.2. Ribbed necks (narrow)

Ribbed necks (narrow) consist of cylindrical necks which exhibit a distinctive horizontal ribbing, normally extending from the rim to the base of the neck (Fig. 3.6, 3.7). In the Kuwaiti and Unguja Ukuu assemblages, such ribbing is present only on the external surface of the necks, revealing how the effect was produced by scoring the exterior of the glass with a sharp tool while still hot. By way of contrast, an example held in the Khalili collection possesses a neck which is ribbed on both its internal and external faces, and is thus presumed to have been formed by 'coiling' rather than the scoring method (Goldstein 2005: 68-9. nos. 59-60). The rims associated with ribbed necks tend to be plain and slightly rounded, in some instances slightly thickened. The necks themselves are normally vertical. Eight fragments of this type were identified in Kuwait, compared to six from Unguja Ukuu (Fig. 3.5.). In terms of size, the Kuwaiti rim diameters range between 10-17 mm (ave. 14.86 mm), with mouth diameter between 6-12 mm (ave. 9.23 mm). The Unguja Ukuu examples exhibit a more restricted range in diameters, with rims 14-17 mm (ave. 15.17 mm) and mouths 8-10 mm (ave. 9.4 mm).

	Kuwait	**Unguja Ukuu**
No. Fragments	8	6
Rim Diameter (ave.)	14.86 mm	15.17 mm
Mouth Diameter (ave.)	9.23 mm	9.4 mm
No. Ribs (max)	4	6

FIG. 3.5. SUMMARY OF RIBBED NECKS (NARROW)

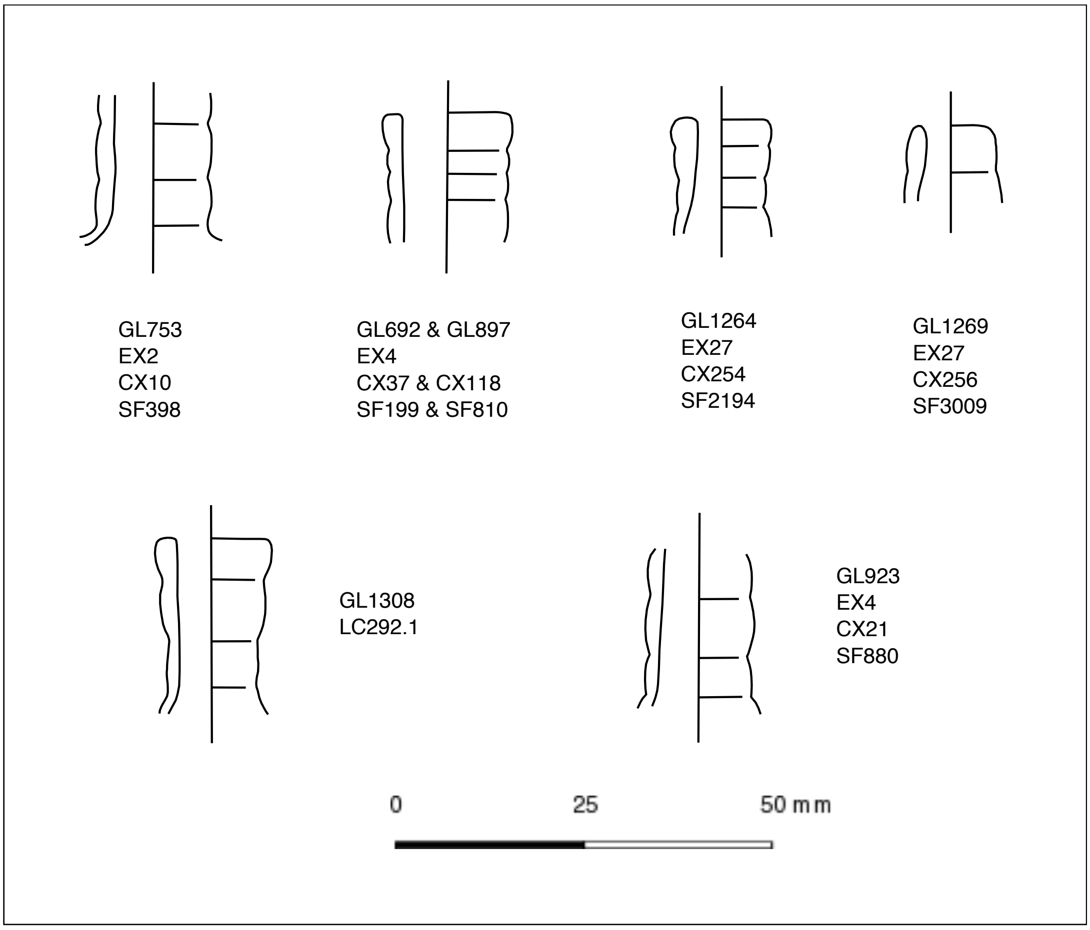


FIG. 3.6. RIBBED NECKS (NARROW) FROM KUWAIT

In general, four or five ribs are found on a single neck. Each rib measures just a few millimetres in height. In the Kuwaiti assemblages, the number of ribs and grooves varies between fragments, though in all but one case it is difficult to be sure of the total number as the full length of the neck is preserved in only one case. The maximum number of ribs preserved in any one case is four (e.g. K-GL692/897/923), while K-GL1308, which is complete, has just three. The rim can be considered an upper rib and is normally thickened in relation to the rest of the neck (e.g. K-GL1264, K-GL692/897/923), though K-GL1308 bulges in the centre. At Unguja Ukuu, between three and six ribs survive on any given fragment, however, the two fragments which preserve a complete neck profile (U-GL1637 and U-GL2657) have six and four ribs respectively.

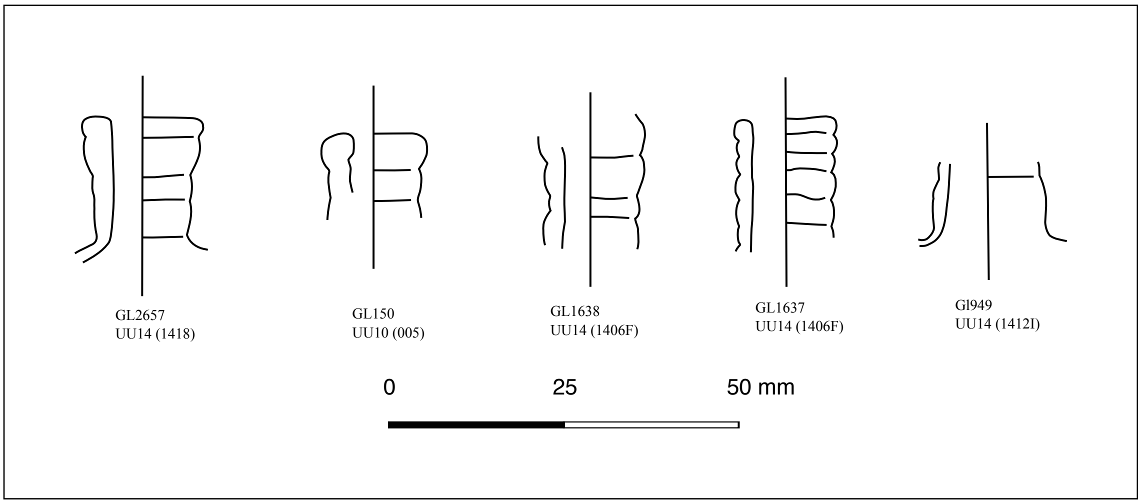


FIG. 3.7. RIBBED NECKS (NARROW) FROM UNGUJA UKUU

Ribbed necks (narrow) are generally quite standardised, however, K-GL1269 is unusual in that it appears to taper towards its narrow mouth. There is some irregularity in the scoring which produces the ribbed effect, in that it is rarely perfectly horizontal nor evenly spaced. This lack of precision may be explained by the difficulty of performing such an operation, or little concern for attention to detail. In addition, there is a small amount of variation in the depth to which the scores have been incised.

Ribbed necks (narrow) appear in CL glass in Kuwait and in IB and OG glass at Unguja Ukuu. There does not appear to be any additional decoration associated with *ribbed necks (narrow)* other than the ribbing itself, although an exception to this is again found in the Khalili collection where a ribbed necked vessel has been inset with several millefiori glass canes (Goldstein 2005: 68-9, nos. 59-60).

In general, *ribbed necks (narrow)* are not uncommon finds in sites of the Early Islamic period, and seem to be a reasonable indicator of an 8th-9th century AD date, perhaps extending into the 10th century. In Egypt, several examples described as 'toilet flasks' from Fustat are dated roughly to the 8th-10th centuries (Scanlon & Pinder-Wilson 2001: 46-7). At Caesarea, where Pollak suggests most are decorated, they have been dated to the late 8th century (Pollak 2003: 167-168, fig. 25-28, 30). Plain examples of the type are known from Abbasid Qal'at Seman (Dussart 2003: 176, fig. 5.4). In Iraq, examples from Seleucia are dated by Negro Ponzi to the 8th century (Negro Ponzi 1970-71: fig. 50.42), while they are also present in the Persian Gulf region at Siraf (Jennings n.d.). Also in Iran, a vessel with a *ribbed neck (narrow)* was identified at Nishapur, and dated to Kroger's default 9th-10th century (Kroger 1995: 80, no. 105). In East Africa, at Unguja Ukuu Juma recovered a square bottle from his Period Ia, that is, up to c. AD 750 (Juma 2004: 126, Pl. 7.1: fig. 1). Other than at Unguja Ukuu, ribbed necks seem rare finds in East African contexts, the only other published example being of a larger bottle with what Morrison described as a 'corrugated neck', found at Manda (Morrison 1984: 166-67, fig. 134j), this being a better parallel for the wide variety (see below).

The body profiles which can be associated with *ribbed necks (narrow)* appear to suggest that they once possessed small and slightly globular bodies. A good range of globular to piriform shapes can been seen in the collection found at Fustat (Scanlon & Pinder-Wilson 2001: 46-7). That said, Juma's earlier excavations at Unguja Ukuu revealed a nearly complete square-bodied form, with each side measuring around 22 mm in width (Juma 2004: 123, fig. 7.1.2). A near identical square-bodied example was also found at Siraf (Jennings n.d.). As another alternative, a different body form was found at Nishapur, where a ribbed neck presents with an elongated and tapering body (Kroger 1995: 80, no. 105). In terms of volumetric capacity, if one assumes a 25 mm width and 50 mm length, these vessels would hold around just 30 ml of contents.

In terms of function, the small mouth diameters (c. 9.5 mm) would have allowed for slow and controlled pouring, which, along with the small capacity of the presumed vessel forms, would make these objects ideal for storing and transporting precious liquid or powdered commodities that were required, or could only be afforded, in small quantities. A range of commodities would fit this bill, including pungent perfumed oils, powdered medicines or exotic ground spices. Of course the use or uses of a particular vessel form are bound to have been varied and multiple, and depend on the cultural and socio-economic background of the consumer, as well as their personal preferences and personality.

However, if such an item was used to transport or store such a precious commodity, it is likely that, in light of the evidence that the glass vessel itself does not appear particularly special or precious, the contents would have exceeded the value of the vessel itself, at least in distribution networks not too distant from point of production. One might even consider the vessel itself to be of secondary concern, instead evidencing a primary demand for a consumable but non-durable commodity that such a vessel might well have contained, rather than being a primary object of exchange in its own right. Of course, as distance from production source increased, and in different cultural and socio-economic contexts, the glass itself may well have increased in value and been desired in and of itself.

It is questionable whether the ribbing should be considered decorative or functional in nature. While there is a certain aestheticism where the presence of any small detail is concerned, the aforementioned irregularity of the ribbing seems to suggest that this was not at the forefront of the mind of the craftsman at least. Rather than decorative, the ribbing instead may have offered a crude thread to facilitate tying a stopper in place.

3.1.3. Ribbed necks (wide)

The category *ribbed necks (wide)* includes wide cylindrical neck fragments which have ribbing similar in style and technique to that discussed above (Fig. 3.9). Again the ribs have been created by scoring the exterior of the neck surface to a shallow depth, are roughly parallel, and of uneven distance apart. The key visual difference between the narrow and wide varieties of ribbed necks is, of course, the diameter, with a small size disparity between the two types. This type is not present at Unguja Ukuu, with just one example from Kuwait (Fig. 3.8).

	Kuwait	**Unguja Ukuu**
No. Fragments	1	0
Rim Diameter	20 mm	-
No. Ribs	5	-

FIG. 3.8. SUMMARY OF *RIBBED NECKS (WIDE)*

The single example from the Kuwaiti assemblages, K-GL1200, possesses a cylindrical neck with five distinct ribs, measuring circa 20 mm in diameter. Its rounded rim, which can be considered the uppermost rib, appears slightly thickened in comparison to the rest of the neck fragment and is distinguished by a score only 1-2 mm below the mouth. Unfortunately its colour is obscured by a thick weathering crust.

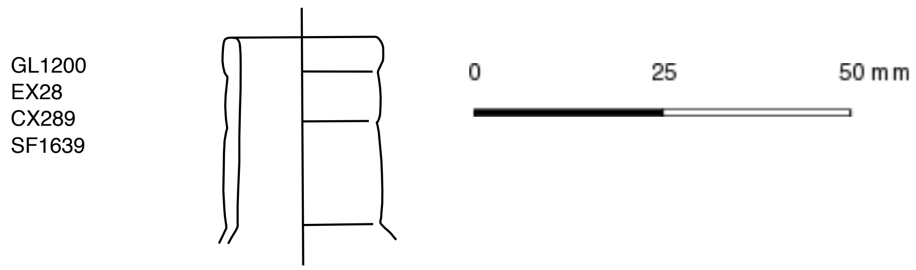


FIG. 3.9. RIBBED NECKS (WIDE) FROM KUWAIT

The closest parallel in the literature belongs to a large closed vessel found at Manda in Periods I+II, with what Morrison describes as a 'corrugated neck' (Morrison 1984: 166-67, fig. 134j). There is no remaining body profile in association with K-GL1200 as it is broken at the base of the neck (L. 27 mm), making interpretation of the overall form of the associated vessel difficult. The parallel identified above offers little additional in this regard, and as a result it is difficult to go beyond invoking the general form of a closed vessel. As such it is also difficult to infer potential functions.

That said, the size difference between the *narrow* and *wide* varieties of *ribbed necks* requires that the range of functions and uses appropriate to a neck of this type would differ significantly from that of the *ribbed necks (narrow)*, with the wider type more suitable for general storage and pouring. Presumably, with such a wide neck and mouth, whatever products were involved are unlikely to have been particularly precious. Again the ribbing may well have been a decorative touch, however it is perhaps better considered as a functional consideration, providing subtle ridges around which to guide the tying of a stopper in place.

3.1.4. Vertical necks (narrow)

The category of *vertical necks (narrow)* includes cylindrical neck fragments which are vertical and quite straight (Fig. 3.10). The rims in question are simple and rounded, and otherwise undistinguished from the neck. This type is not particularly distinctive, and is thus difficult to define in general terms. A range of possible comparisons can be made with similarly plain vessels from Seleucia (Negro Ponzi 1970-71: fig. 49-50) and Siraf (Jennings n.d.), to name but two. However, based on the fact that just one fragment was found in Kuwait, and that it is not present at Unguja Ukuu, it is difficult to be confident about these parallels (Fig. 3.11.).

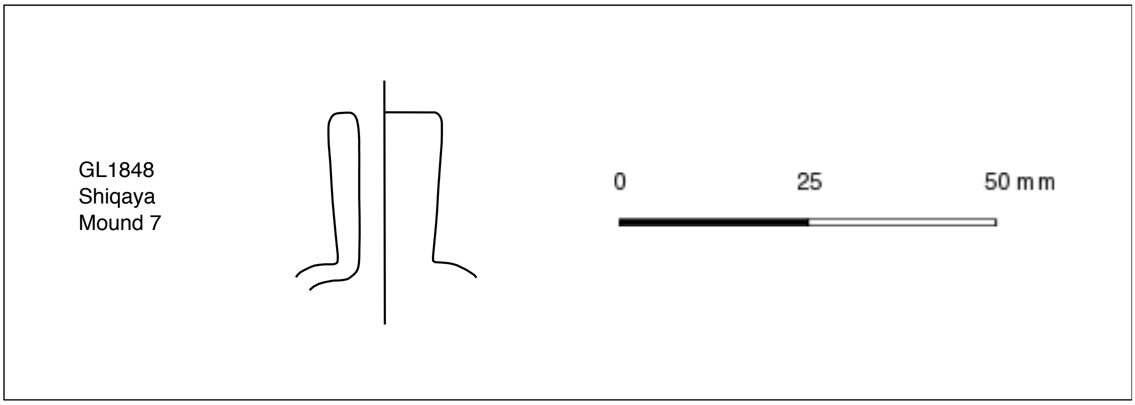


FIG. 3.10. VERTICAL NECKS (NARROW) FROM KUWAIT

As such it is better to consider the single example from Kuwait, K-GL1848, as representative of this type. K-GL1848 has a cylindrical neck of 12 mm diameter and which measures 20.3 mm in length. The neck is not perfectly vertical, with one side slightly flaring compared to the other creating a very slight, barely noticeable lopsided effect. This seems to be an unintentional variation introduced by the glassworker. As suggested above, the rim itself is undistinguished from the neck and has been fire rounded. The internal mouth opening is central, perfectly circular and quite narrow (D. 6.5 mm). One noticeable feature worth commenting upon is that the glass metal is relatively thick for such a small vessel (T. 3 mm), a thickness which remains quite uniform throughout. The metal is a CL glass with a pale green tinge, with no other decoration or embellishment. Good parallels for this rather nondescript type are somewhat few and far between, but can be found at Siraf (Jennings n.d.). In terms of overall form, *vertical necks (narrow)* are presumed to belong to small vessels of perhaps 20-25 mm diameter. Indeed, a small fragment of the body profile of K-GL1848 survives. Initially flat, the shoulder rapidly takes a sharp downwards curve, suggesting a narrow, straight-sided and presumably short vessel profile (D. 20-25 mm). As with types of similar size and proportions, it is likely that the vessels associated with *vertical necks (narrow)* would have been well suited to use as containers for the storage, transportation and consumption of pourable, precious commodities.

	Kuwait	Unguja Ukuu
No. Fragments	1	0
Rim Diameter	12	-
Neck Diameter	12	-
Mouth Diameter	6.5	-
Neck Length	20.3	-

FIG. 3.11. SUMMARY OF VERTICAL NECKS (NARROW)

3.1.5. Vertical necks (wide)

The category of *vertical necks (wide)* includes those fragments with vertical neck profiles of a diameter around four times as wide as that of the *vertical neck (narrow)* type (Fig. 3.12). Three examples are known from Unguja Ukuu, while none are present in the Kuwaiti assemblages.

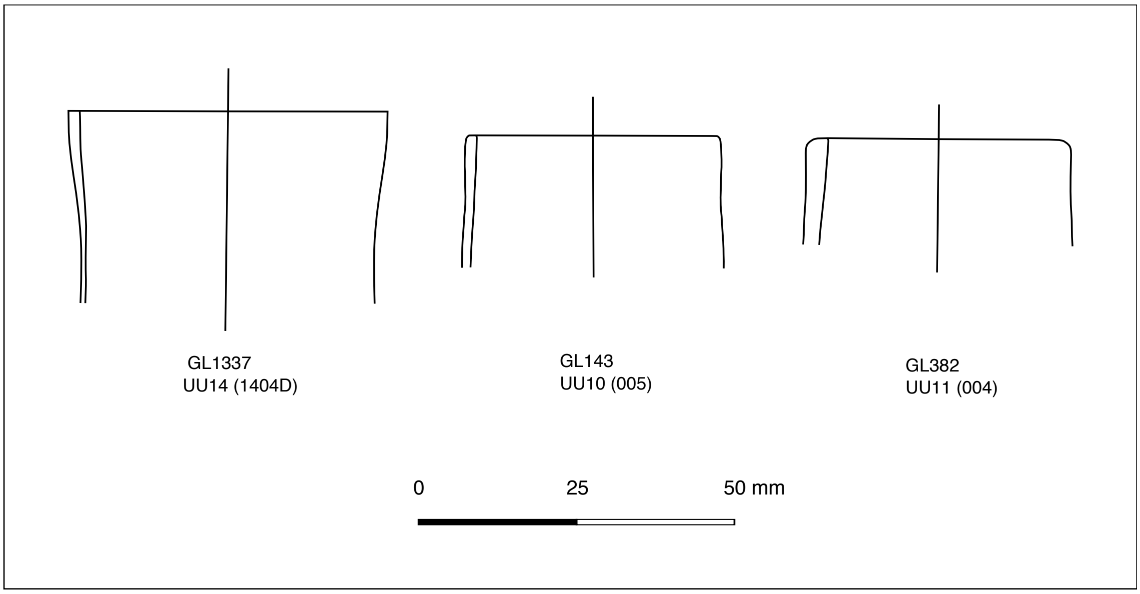


FIG. 3.12. VERTICAL NECKS (NARROW) FROM UNGUJA UKUU

The *vertical necks (wide)* from Unguja Ukuu range from 40-50 mm rim diameter. In profile the necks are almost truly vertical, however U-GL1337 begins to flare slightly towards the rim. Slight differences can be observed in the glassworker's finishing process. Two of the rims, U-GL143 and U-GL1337, have been 'cracked-off', while U-

GL382 is thicker and has been fire rounded. In terms of colour, the Unguja Ukuu fragments fall into the CL and IB colour groups, and none exhibit any form of decoration. The *vertical necks (wide)* possess rim and neck diameters wide enough to enable them to be considered as semi-open forms, meaning the mouth and neck are not so narrow as to restrict access to the vessel contents in a functional regard. Obviously the width of these vertical necks influences the range of vessel forms and functions one might predict to have been associated with them. Again they might be interpreted as the upper portion of large jugs rather than small 'beakers' or 'cups'. Vessels with necks and mouths of a similar diameter and profile are not unusual, and have been recognised in 8th to 10th century AD contexts at Shanga (Horton 1996b: 317, fig. 239i) and Manda (Morrison 1984: 167, fig. 134) in East Africa, as well as at Siraf (Jennings n.d.), at Fustat (Scanlon & Pinder-Wilson 2001: 32-3, 36, 38, figs. 12, 14-15), and Nippur (Meyer 1996: 248, figs. 1, nos. 8-9). A particularly illustrative example of the possibility involved comes from Nishapur (Kroger 1995: 84, no. 113), where a jug (perhaps with a missing handle) with a long and relatively straight-sided neck has a rim diameter of c. 50 mm.

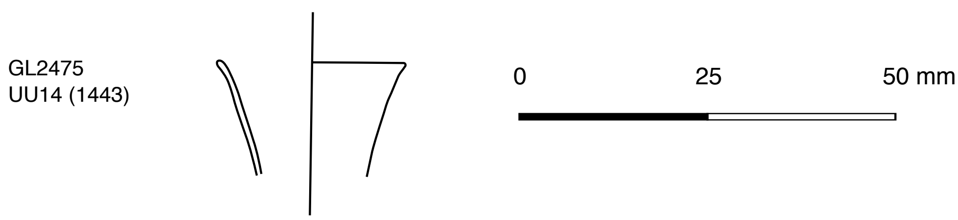


FIG. 3.13. FLARING NECK (STRAIGHT) FROM UNGUJA UKUU

3.1.6. Flaring necks (straight)

Flaring necks (straight) are those which splay gently outwards from the body towards the rim (Fig. 3.13, 3.14). The *straight* variety includes those whereby the neck flares at a roughly constant angle, though includes in some cases those which start slightly more vertical but quickly begin flaring. This result was presumably by progressively widening the mouth opening while maintaining a constriction around the base of the neck. The angle at which the neck flares is quite variable, ranging from perhaps 45 to 75 degrees (measured according to an imaginary line perpendicular to the upright stance of the fragment). Some of the fragments are slightly less flaring at the rim. Just two such fragments were identified at Unguja Ukuu, with 29 from Kuwait (Fig. 3.15.).

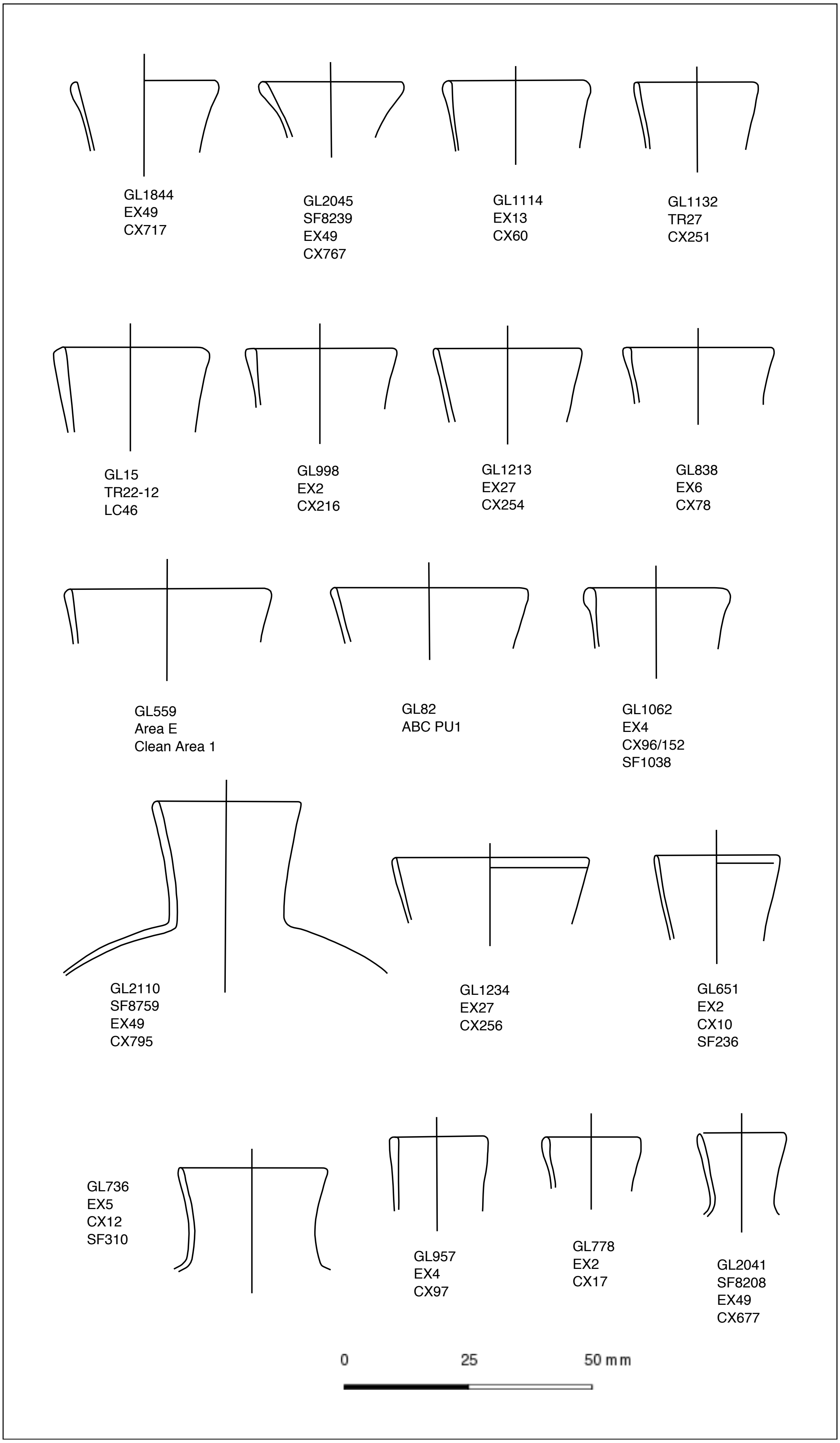


FIG. 3.14. FLARING NECKS (STRAIGHT) FROM KUWAIT

There is considerable variation within this category is in terms of size, with rim diameters ranging from a minimum of 10 mm to a maximum of 40 mm, though concentrating around 25 mm in diameter. Most of the rims are plain with a tendency to be slightly rounded and thickened relative to the neck, while simple cracked-off rims appear on K-GL1072/957. K-GL651 has been scored just below the rim. At Unguja Ukuu, U-GL2475 appears to have been neatly cracked-off and left more or less untouched, while U-GL3255 appears to have been slightly rounded.

	Kuwait	**Unguja Ukuu**
No. Fragments	29	2
Rim Diameter (ave.)	26.67 mm	22.5 mm
Max Rim Diameter	40 mm	25 mm
Min Rim Diameter	10 mm	20 mm

FIG. 3.15. SUMMARY OF FLARING NECKS (STRAIGHT)

The colour of the glass metal offers another source of variation. Among the Kuwaiti fragments most are heavily corroded, though some reveal LGB, CL and OG glass, with LGB and OG glass also seen at Unguja Ukuu. Regarding overall vessel forms and function, it would probably make sense to separate the smaller examples of *flaring necks (straight)* from the wider ones, though where exactly this should be done is a matter of personal choice. One fragment (K-GL2110) reveals a hint of body profile, in this case a globular-shaped upper-body. Even the larger examples are suggestive of delicate containers (whether termed small bottles or jars), with the flaring neck allowing for easing of pouring but also re-filling. The flaring neck allows for simple sealing using a ‘cork’ or bung that can be easily removed. The suggestion of a use where little control over pouring is necessary again indicates an association with a liquid commodity that is not necessarily precious but frequently used, perhaps in the context of cooking, eating and drinking. Thus they might be part of a range of household items, whether for commodity storage or as a serving tableware.

That said, the fragility of the surviving fragments of *flaring necks (straight)*, particularly of the larger examples, suggests they are unlikely to have been moved around much, and may have been used sparingly. Regarding the smaller examples, a quite different range of uses is probably likely, again returning to the idea that they could have functioned as relatively simple bottles for using, storing and transporting other precious commodities such as cosmetics, medicines, spices and toiletries. As this type of profile is nondescript and quite common, it is not easy to identify secure parallels in the literature for the exact type of vessels identified here. As an example, several vessels from Nippur seems to be close examples, and while probably from late-7th or 8th century AD contexts are called 'Sasanian' by the author (Meyer 1996: 248, fig. I.4). Other possible examples are found at Tiberius (Lester 2003: 159, fig. 2-13), as well as on the East African coast at Manda (Morrison 1984: 167, fig. 134. h, i). It is almost worth considering this category in isolation from its external parallels, as these seem to contribute to the confusion rather than offer any helpful information.

3.1.7. Flaring necks (rolled-in rims)

This type of flaring neck includes those whereby the rim is distinguished from the neck having been slightly 'rolled' inwards, rather than fully folded (Fig. 3.16, 3.17). The gentle roll has likely been effected through a gentle tooling and serves to thicken and round the rim. The necks tend to start relatively vertical before gradually flaring to greater and greater degrees, often with an angle of less than 45 degrees. Close to the mouth, where the rim has been folded, the profile appears slightly more vertical as a result. Seven *flaring necks (rolled-in rims)* were found in Kuwait, with two at Unguja Ukuu (Fig. 3.18.).

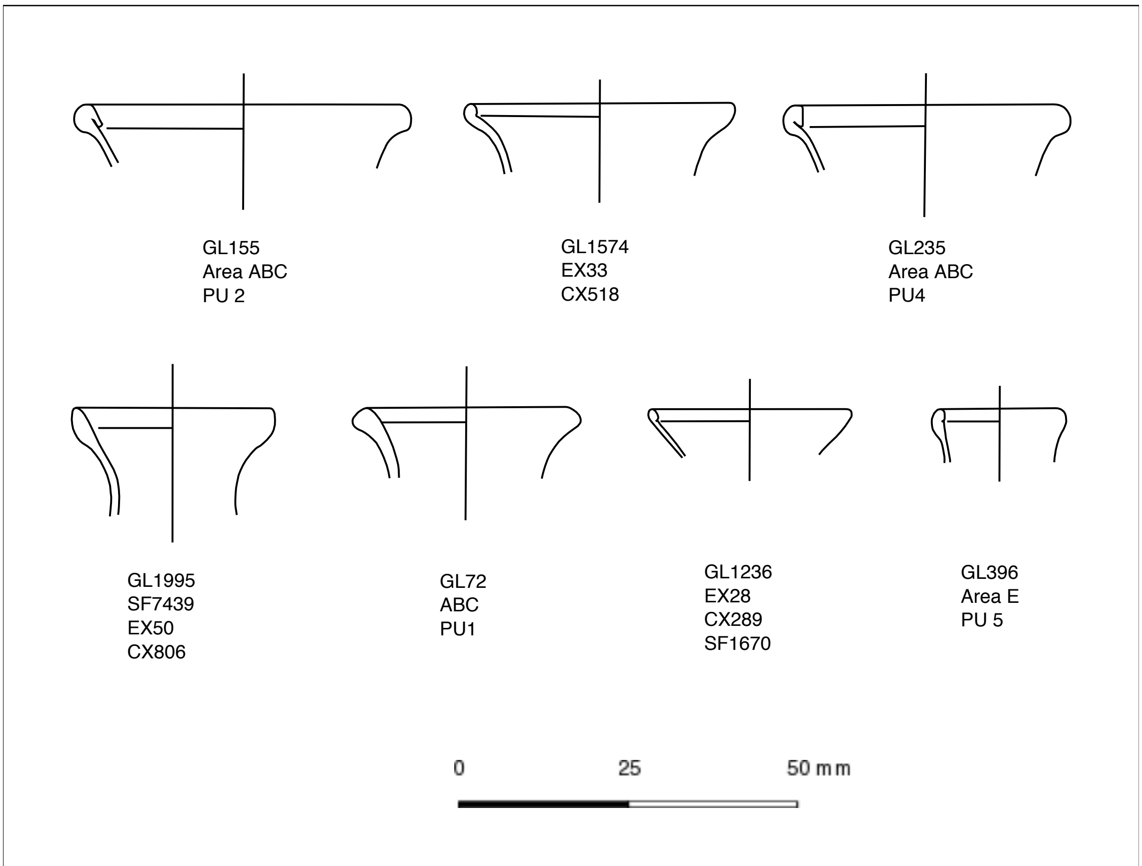


FIG. 3.16. FLARING NECKS (ROLLED-IN RIMS) FROM KUWAIT

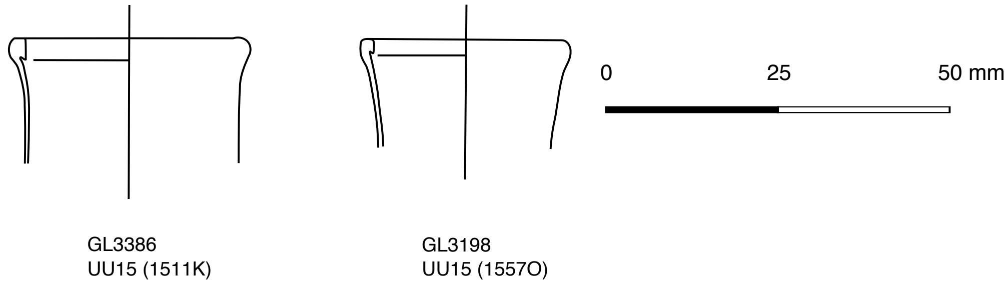


FIG. 3.17. FLARING NECKS (ROLLED-IN RIMS) FROM UNGUJA UKUU

Among the Kuwaiti material there is a considerable variety in rim diameter, ranging from a minimum of 20 mm to a maximum of 50 mm (ave. 34.29 mm). Of the two fragments from Unguja Ukuu with *flaring necks (rolled-in)*, U-GL3198 and U-GL3386, the rim diameters measure 30 mm and 40 mm respectively. The *rolled-in* method serves to thicken the rim in relation to the neck, and often leaves a groove on the interior of the neck where the rolled-in portion of the rim joins the internal face of the vessel. With the Kuwaiti examples this is normally 2-3 mm below the rim (see K-GL72 and K-GL235).

	Kuwait	**Unguja Ukuu**
No. Fragments	7	2
Rim Diameter (ave.)	34.29 mm	35 mm

FIG. 3.18. SUMMARY OF FLARING NECKS (ROLLED-IN RIMS)

The extent to which the rolled-in section of the rim protrudes from the wall varies. Sometimes it lies flush (e.g. K-GL72, K-GL1236, K-GL1574, K-GL19950, at other times it is uneven and protruding by up to 1 mm (K-GL235, K-GL155, K-GL396), though is more prominent in the case of U-GL3386. The resulting rim is slightly rounded on the exterior and flat on the interior. None of the fragments from Kuwait nor Unguja Ukuu exhibit any decoration. Most are naturally coloured, falling under the LGB and OG categories, however a Kuwaiti example in TQ glass appear to have been deliberately coloured.

Unfortunately as the shape and size of the remainder of the body profile remains unknown, there are limits upon what can be said about possible functions. Although only the very upper portion of either vessel is preserved, it is most likely that they belong to 'jugs' or 'semi-open' bottle forms rather than small 'cups'. Regardless of overall form, vessels with such a neck and mouth profile would be readily suited to pouring and refilling, with the widely flaring and rolled-in rim discouraging spillage when filling. Like the other vessels with flaring necks this type would have allowed for easy sealing. Although slightly 'rolled-in' rims are not uncommon, comparisons with other assemblages offer few exact matches for these vessels. A similar *rolled-in rim* from Seleucia is dated to the 8th century (Negro Ponzi 1970-71: fig. 40, no. 30), with a wider than average example at Bat Galim indicating a Levantine distribution (Pollak 2008: 58, fig. 2.13).

3.1.8. Flaring necks (rolled-out rims)

The *flaring neck (rolled-out rim)* is rarely observed, but is similar to the above category except in the respect that the tip of the rim has been 'rolled' outwards (i.e., not quite folded) to join the exterior of the vessel, rather than inwards as with the *rolled-in rims* (Fig. 3.19). This type is not present at Unguja Ukuu, with only a single fragment found in the Kuwaiti assemblages. That fragment, K-GL397, measures 50 mm diameter at the mouth. The rim leaves a slight join-mark on the exterior of the vessel where it meets the side-wall. In terms of colour, K-GL397 is included under the LGB category.

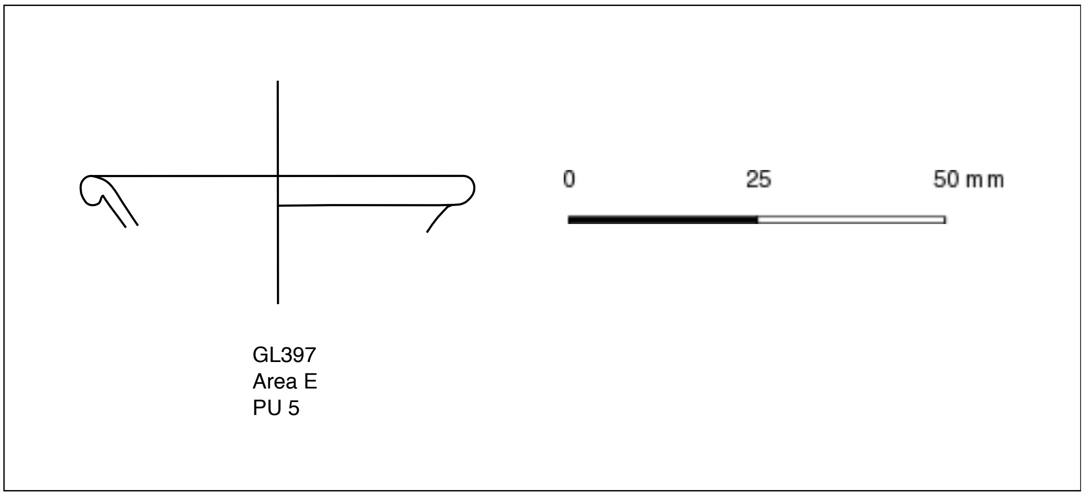


FIG. 3.19. FLARING NECKS (ROLLED-OUT RIMS) FROM KUWAIT

Owing to the small extent of the surviving neck and rim profile, as well as the few clues provided by external parallels, it is difficult to say much about the overall form and function of vessels with this type of flaring neck. Based on the flaring profile, the most appropriate function of any related vessel would likely concern pouring and refilling as part of a set of tablewares, similar to that for the other flaring neck types discussed above.

3.1.9. Flaring necks (bevelled rims)

This 'semi-open' vessel form is defined according to the presence of a typical flaring neck in association with rims which are *bevelled* sharply on their external side (Fig. 3.20, 3.21). The end result is a rim tip which appears pointed. This type of rim also has a tendency to become slightly everted, even in relation to the already flaring side-walls. Four such fragments were identified in Kuwait, with two at Unguja Ukuu (Fig. 3.22.).

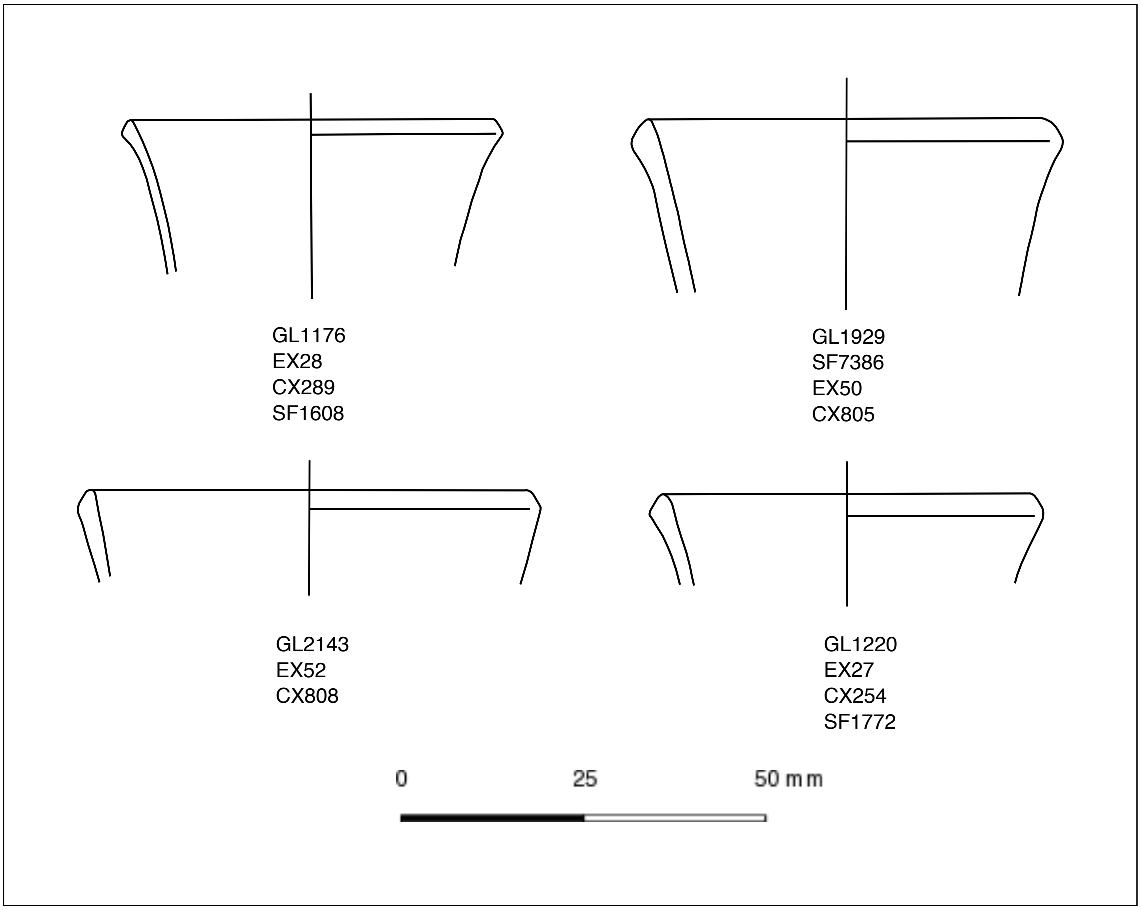


FIG. 3.20. FLARING NECKS (BEVELLED RIMS) FROM KUWAIT

Among the four Kuwaiti examples, the rims are of fairly uniform diameter, ranging from 50 to 60 mm, while the two examples from Unguja Ukuu both measure 50 mm in diameter. The total length of the neck is unknown due to the fact that the fragments in both assemblages are incomplete in this regard. The bevelling is sharp and clearly pronounced in each case, and indistinguishable between the assemblages. That said, K-GL2143 is more rounded than the others due to the accumulation of a heavy weathering crust. There is some variation in the thickness of the bevelled rim, from a minimum of 2.1 mm (K-GL1176) to a maximum of 3.9 mm (K-GL1929), with both the Unguja Ukuu fragments measuring 2.7 mm thick. No decoration is present in association with this type. All the Kuwaiti fragments are produced in LGB glass, with one of the Unguja Ukuu fragments in IB glass.

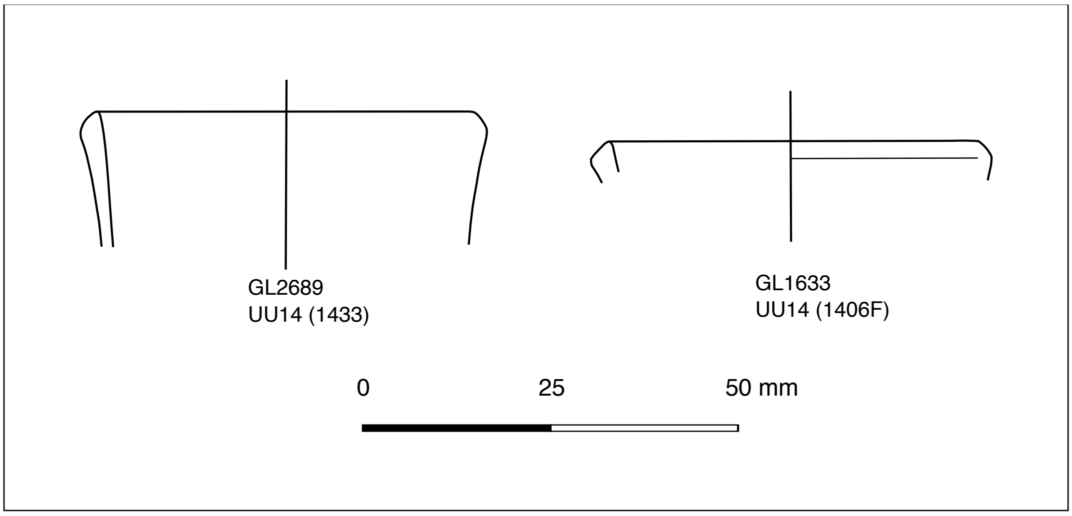


FIG. 3.21. FLARING NECKS (BEVELLED RIMS) FROM UNGUJA UKUU

	Kuwait	Unguja Ukuu
No. Fragments	4	2
Rim Diameter (ave.)	53.75 mm	50 mm
Thickness of Bevelling	2.1 mm - 3.9 mm	2.7 mm

FIG. 3.22. SUMMARY OF FLARING NECKS (BEVELLED RIMS)

As again only rim and partial neck portions were preserved, it is difficult to infer much as regards to overall forms. As such, in terms of function therefore, a range of options are possible. Such rim types could be associated with small beaker-like vessels, goblets or even large carafe-like jugs employed as tablewares used for serving.

3.1.10. Flaring necks (bulging)

This type includes fragments where the standard flaring trajectory is interrupted somewhere along the mid-point of the neck profile by a deliberate bulge (Fig. 3.23, 3.24). This bulge need not be hugely prominent, just enough that it might be identified as a deliberate manipulation of the vessel neck. This type is not present at Kuwait, with just one such example from Unguja Ukuu.

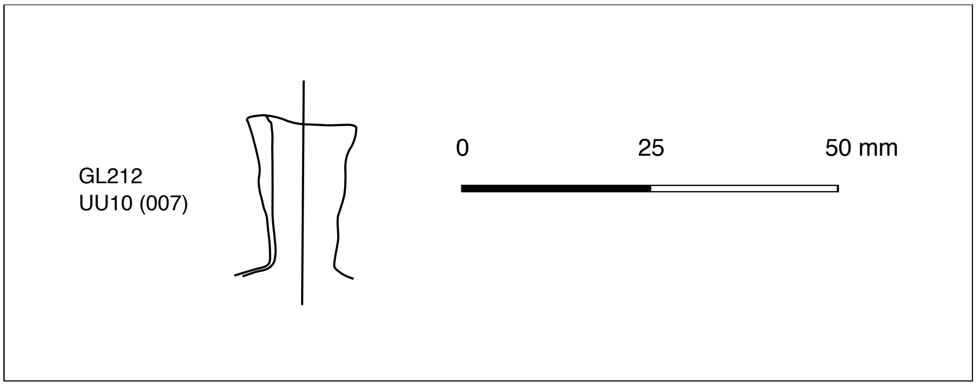


FIG. 3.23. FLARING NECKS (BULGING) FROM UNGUJA UKUU

U-GL212 consists of a relatively standard flaring neck in CL glass, leading to a neat cracked-off rim 15 mm in diameter. The neck possesses a clear and deliberate 'bulge' roughly half-way down its length, which measures 21 mm in total. At its narrowest point, the neck measures 8.8 mm in diameter, expanding to 12 mm at the bulge. The bulge is slightly more prominent on one side.

	Kuwait	**Unguja Ukuu**
No. Fragments	0	1
Rim Diameter	-	15 mm
Diameter at Bulge	-	12 mm
Minimum Neck Diameter	-	8.8 mm
Neck Length	-	21 mm

FIG. 3.24. SUMMARY OF FLARING NECKS (BULGING)

Although the *bulging* neck is reasonably widely distributed in Islamic glassware and thus likely to represent a deliberate feature, close contemporary parallels for this small bottle are hard to come by and only inadequate matches are found at the usual sites. These include Shanga (Horton 1996b: 317, fig. 239h), Manda (Morrison 1984: 67, fig. 134l, n-o), Kilwa (Chittick 1974: 405, fig. 157a, c-d, f-h), Kisimani Mafia (Morrison 1987: 303, fig. 4.4), Fustat (Scanlon & Pinder-Wilson 2001: 43, 48-9, fig. 18a-b, d, fig. 21a-c), Tiberius (Lester 2003: 160-61, fig. 2.20-1), Siraf (Jennings n.d.), Seleucia (Negro Ponzi 1970-71: fig. 49, no. 20, fig. 50, no. 41), and Nishapur (Kroger 1995: 70-1, 88).

In terms of overall vessel form, only a small hint of the upper body profile can be garnered from U-GL212, with the suggestion of a delicate globular body form. Owing to the small dimensions and indeed fragility of the surviving neck fragment, it is likely that

U-GL212 originated from an equally fine and delicate vessel with a small capacity. The neck is narrow and would have been easy to seal with a stopper, however it is fragile suggesting the use of something textile rather than solid. This raises the issue of the purpose of the bulge. Having suggested that it is clearly deliberate, the question thus becomes whether it was a decorative addition or purely functional. If a decorative addition, then it seems a rather perfunctory one, with the bulge more prominent on one side. If functional, it might have served to strengthen a fragile neck to allow for sealing, or even to provide something prominent around which to tie a sealing in place, thus preventing it slipping. Neither of these explanations work either, as the creation of the bulge actually weakens the neck in certain places, while the bulge is not prominent enough to help with sealing. Perhaps the best interpretation is that it provides a neat grip for finger and thumb when picked up. While such a feature is not actually necessary, this does not mean that it is not helpful.

What then of the function of the vessel to which U-GL212 belonged? If it is presumed that this small and delicate neck was associated with an equally small and delicate body form, then its limited volumetric capacity, narrow neck and mouth makes it likely that the associated vessel was intended to hold something required or afforded only in small quantities, and in this context might range from spices to medicines to perfumes and other cosmetics. As argued above, most commodities kept in small quantities are relatively precious, and thus likely to amount to a greater value than the container itself. Thus, it is possible to argue that U-GL212 belonged to a vessel which made its way to Unguja Ukuu as a container for a precious commodity which was itself the focus of trade, whatever its eventual purpose at its final destination. This is not to say that the vessel itself wasn't considered of value, it undoubtedly was at such a distance from its production source and at a site where all glass objects came from some distance overseas. Indeed, the unique profile and delicacy of this neck fragment might indicate that among comparable vessel forms, U-GL212 stood out.

3.1.11. Flaring necks (wide-mouthed)

As a component of Early Islamic closed rim types, *flaring necks (wide-mouthed)* are somewhat unusual. Here they are defined as those rim and neck fragments with a very widely-flaring mouth, which has the effect of creating a wide but shallow 'funnel' shape (Fig. 3.25). The rim itself tends to be thickened in relation to the neck and plainly rounded, with no other defining features. The neck, as far as it is preserved, appears to be around half the diameter of the mouth opening. *Flaring necks (wide-mouthed)* are not present in the Kuwaiti assemblage, with just two fragments from Unguja Ukuu. Both possess rim diameters of 30 mm, with rims that have been rounded and thickened in relation to the neck. U-GL3387 suggests that this appearance has been achieved by folding the rim tip inwards upon itself before finishing. Neither of these small fragments can be associated with any decoration, with one produced in IB glass and the other in an OG metal.

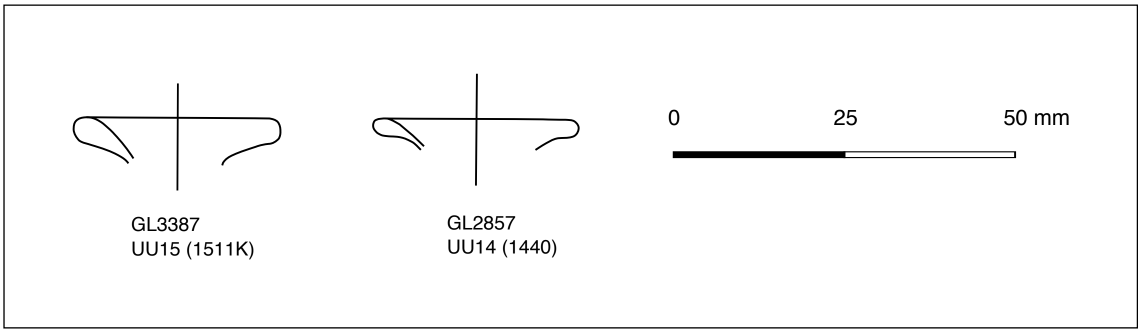


FIG. 3.25. FLARING NECKS (WIDE-MOUTHED) FROM UNGUJA UKUU

The Unguja Ukuu fragments contribute little in terms of predicting overall vessel profile, as both are broken fairly high up on the neck. As such it is difficult to say much about associated vessel body forms other than to speculate that the *flaring necks (wide-mouthed)* fragments from Unguja Ukuu belonged to small closed vessels of the type normally considered flasks or bottles, with reasonably small volumetric capacity. As mentioned above, it is likely that neck diameter was less than half of that of mouth diameter. In a functional sense the exaggerated width and funnel-shaped mouth/neck combination would facilitate pouring and refilling, but not necessarily be easy to seal. Thus again this raises the prospect of the vessel primarily as a container for another commodity. As the funnel-shape of this rim and neck type would facilitate both pouring and refilling, regular use and less need for control over quantity dispensed might be inferred. As such, it is less likely that this commodity would have been particularly precious, perhaps instead a liquid more associated with a kitchen or table environment than a toiletry or cosmetic item. This is obviously, somewhat conjectural and speculative, but is worth considering nonetheless.

3.1.12. Miniature jars

The *miniature jar* is a well known feature of Early Islamic glassware (Fig. 3.26). Rather than a miniature version of other vessel forms, the *miniature jars* discussed here are a category of vessel in their own right. These vessels normally consist of a small globular body and slightly constricted neck. They are invariably simple, and often irregular and crudely made. This type is not present in the Kuwaiti assemblages, with just a single fragment from Unguja Ukuu.

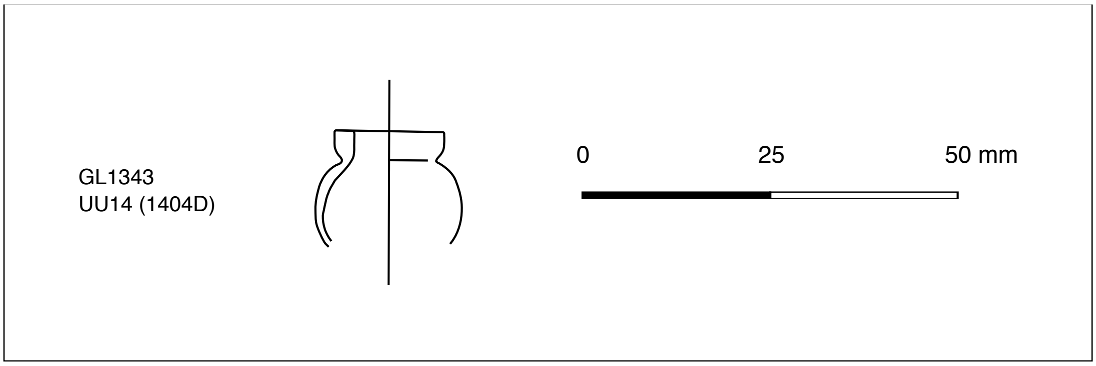


FIG. 3.26. MINIATURE JAR FROM UNGUJA UKUU

U-GL1343 reveals an almost complete profile of a *miniature jar,* with just the base missing. The vessel possesses a small bulbous body, a short and slightly constricted neck, and a neatly 'cracked-off' rim. The body diameter is of 20 mm, and the rim measures 15 mm in diameter. Altogether the fragment as a whole survives at around 15 mm in height, though it is uncertain what the missing portion of the base would add to this. The metal is an IB glass, and exhibits no further decoration or embellishment.

A wide range of miniature jars were found at Nishapur, where Kroger dates them to his default 9th-10th century (Kroger 1995: 61-70). Others were found at Seleucia (Negro Ponzi 1970-71: Fig. 49.1-2), and Samara (Lamm 1928: 21-22, Fig. 19). Miniature jars may have an uncertain purpose, but nonetheless present an interesting proposition. Such vessels would hold only a small volume of contents, perhaps as little as 5-10 ml, and yet the mouth is wide in relation to the body thus making them difficult to seal and unsuitable as containers for anything liquid. An alternative option is that they would have been used to keep a powder, a ground spice or something used for medicinal or cosmetic purposes, perhaps something like kohl. That said, yet again it is likely that such a vessel was less valuable than the commodity it may have contained.

3.1.13. Internally-constricted necks

The *internally-constricted neck* is a rare but not unknown occurrence within Early Islamic glassware (e.g. Negro Ponzi 1972: 217, fig. 21.36). This type is defined by the presence of a horizontal protrusion of glass within the neck which functions as a kind of internal constriction (Fig. 3.27). No internally-constricted necks are present at Unguja Ukuu, with only a single example from Kuwait. K-GL1717 exhibits a tapering profile (Max D. 20 mm; Min D. 9.5 mm). The constriction itself is 1.3 mm thick and is perforated with an opening narrower than that of both the neck and mouth. The surviving fragment profile does not preserve the rim and is too corroded for metal identification. Nor does the fragment give any idea of the overall body profile.

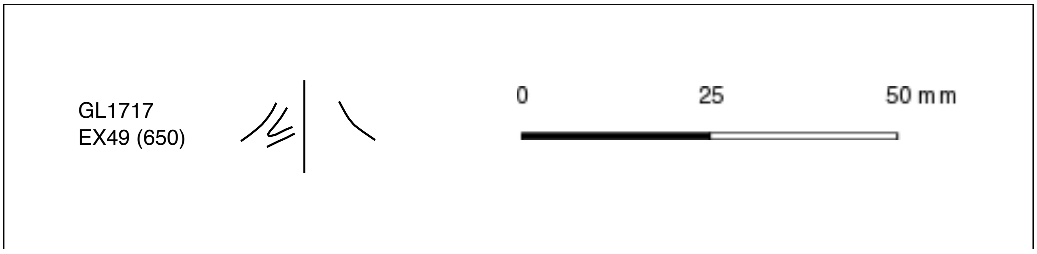


FIG. 3.27. CONSTRICTED NECK FROM KUWAIT

In terms of function, the idea behind the constriction is surely to slow the pouring speed of the vessel to that of a dropper while allowing for a vessel mouth and neck large enough to hold a substantial and secure stopper. As such, such a vessel is likely to have been used to contain a commodity required in small quantities and presumably reasonably precious, such as a cosmetic or medicinal liquid. In this case the intricate design of the glass vessel (and their relative rarity) would have added some value to the vessel itself, and it is unlikely to have been valued just as a container for a precious item but as a precious item in its own right.

3.1.14. Partially diagnostic neck and shoulder fragments

In any archaeological assemblage there will be a number of fragments which are partially diagnostic of a general type but may belong to several more specific types. The *partially diagnostic neck and shoulder fragments* which are dealt with here clearly belong to rim and neck types from closed vessels, but could belong to a number of the specific types outlined above. As this catalogue is non-hierarchical they have been considered as a category in their own right, rather than try to assign them to specific types based on very little solid evidence. Three sub-groups have been identified.

A) Those fragments with thick cylindrical necks. These are reminiscent of the type of neck fragment associated with the *folded and flattened rims* discussed above, and indeed it is difficult to imagine what other kind of rim type these fragments could be associated with.

B) Fragments with more delicate necks produced in thinner glass, often larger in diameter than those in sub-group A. They are similar to those necks included in the *flaring necks (straight)* category above, as well as some of the other flaring neck types.

C) This sub-group contains a wide range of upper body/shoulder fragments which are clearly indicative of a closed vessel form, but which offer little other diagnostic information. Owing to the relative lack of information, it is not worth attempting to explore external parallels or to make any comments on form and function in addition to those made in the sub-sections above.

3.2. Open Rim Types

3.2.1. Stepped rims

Stepped rims are a distinctive type that is becoming an increasingly well recognised part of the Early Islamic glass tradition. *Stepped rims* are characterised by the presence of a thickened ridge or ‘step’ running horizontally around the vessel just several millimetres below the rim (Fig. 3.28, 3.29, 3.30, 3.31). *Stepped rims* reveal a similar ‘chaîne opératoire’ to *Triangular-beaked rims*, with transition from one form to another demonstrably possible, and thus may have shared a similar chronology and geographic origin. Forty-seven *stepped rim* fragments were identified at Unguja Ukuu, compared to 20 fragments from the Kuwaiti assemblages.

	Kuwait	**Unguja Ukuu**
No. Fragments	20	47
Rim Diameter (ave.)	97.65 mm	84.78 mm
Range of Diameters	70 - 110 mm	60 - 120 mm
Step Thickness (ave.)	2.71 mm	1.69 mm
Step to Rim Distance (ave.)	4.26 mm	2.88 mm

FIG. 3.28. SUMMARY OF STEPPED RIMS

In terms of dimensions, the Kuwaiti examples vary in diameter from a minimum of 70 mm to a maximum of 110 mm (ave. 97.65 mm). The Unguja Ukuu rim diameters vary more widely than the Kuwaiti examples, between 60-120 mm, and the average is slightly smaller at 84.78 mm. Altogether, the Unguja Ukuu examples seem to be slightly smaller in size than the Kuwaiti stepped rims. There can be considerable variation in the extent to which this step is pronounced, and an interesting question for future consideration is whether differences in this regard have any spatial or temporal significance. With the Kuwaiti examples the step thickness varies from a minimum of 1.5 mm to a maximum of 5.8 mm (ave. 2.71), as does the distance from rim to step (min. 2.5 mm; max. 6.8 mm; ave. 4.26 mm). There are also large variations in the thickness of the step at Unguja Ukuu, from 0.4 mm to 4.1 mm, averaging 1.69 mm, and in the distance from the step to the rim, from 0.7 mm to 6.3 mm, averaging 2.88 mm. It is clear that, in some cases, the thickness of the step can vary within a single vessel, as is the case in that vessel represented by K-GL1302/1435.

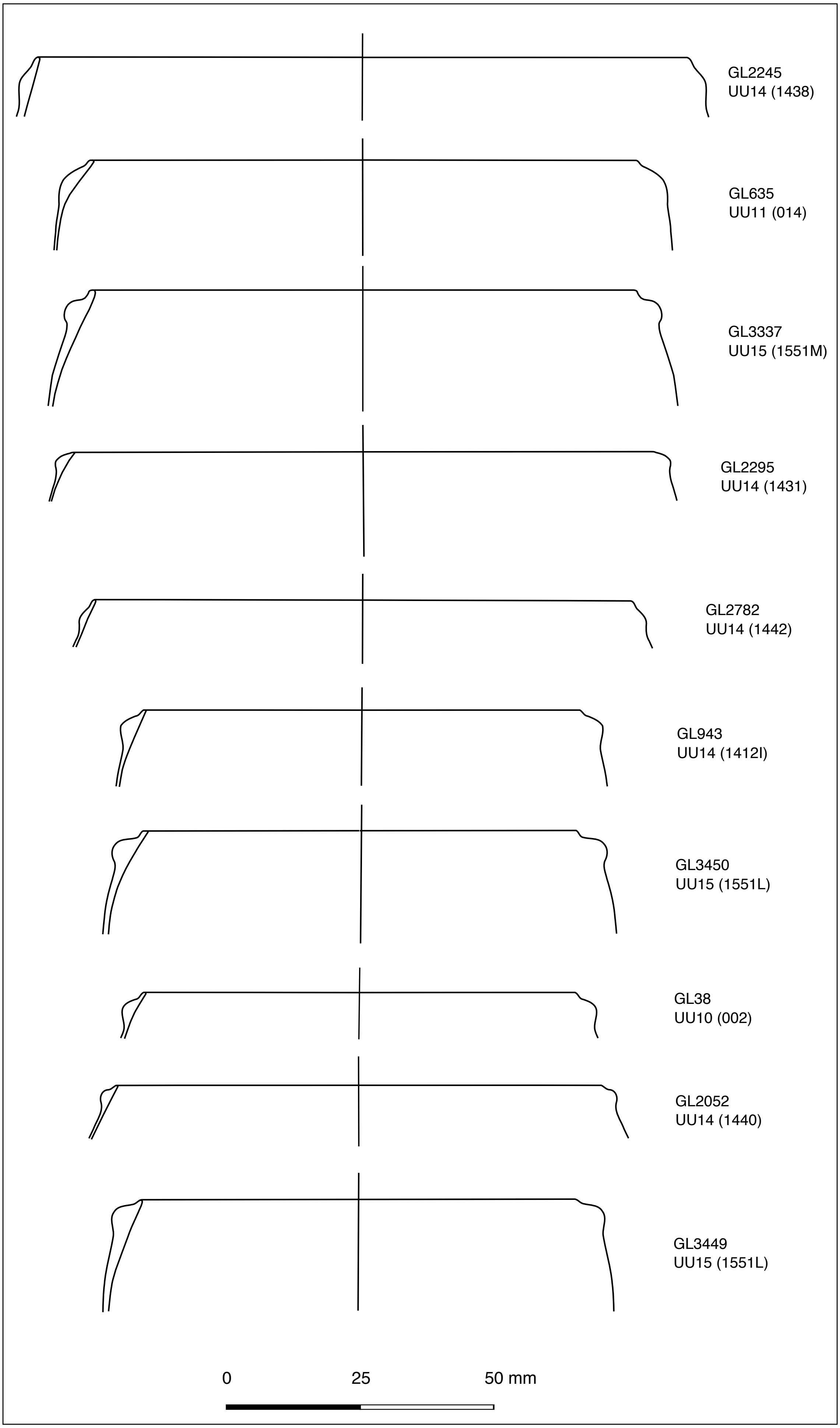


FIG. 3.29. STEPPED RIMS FROM UNGUJA UKUU

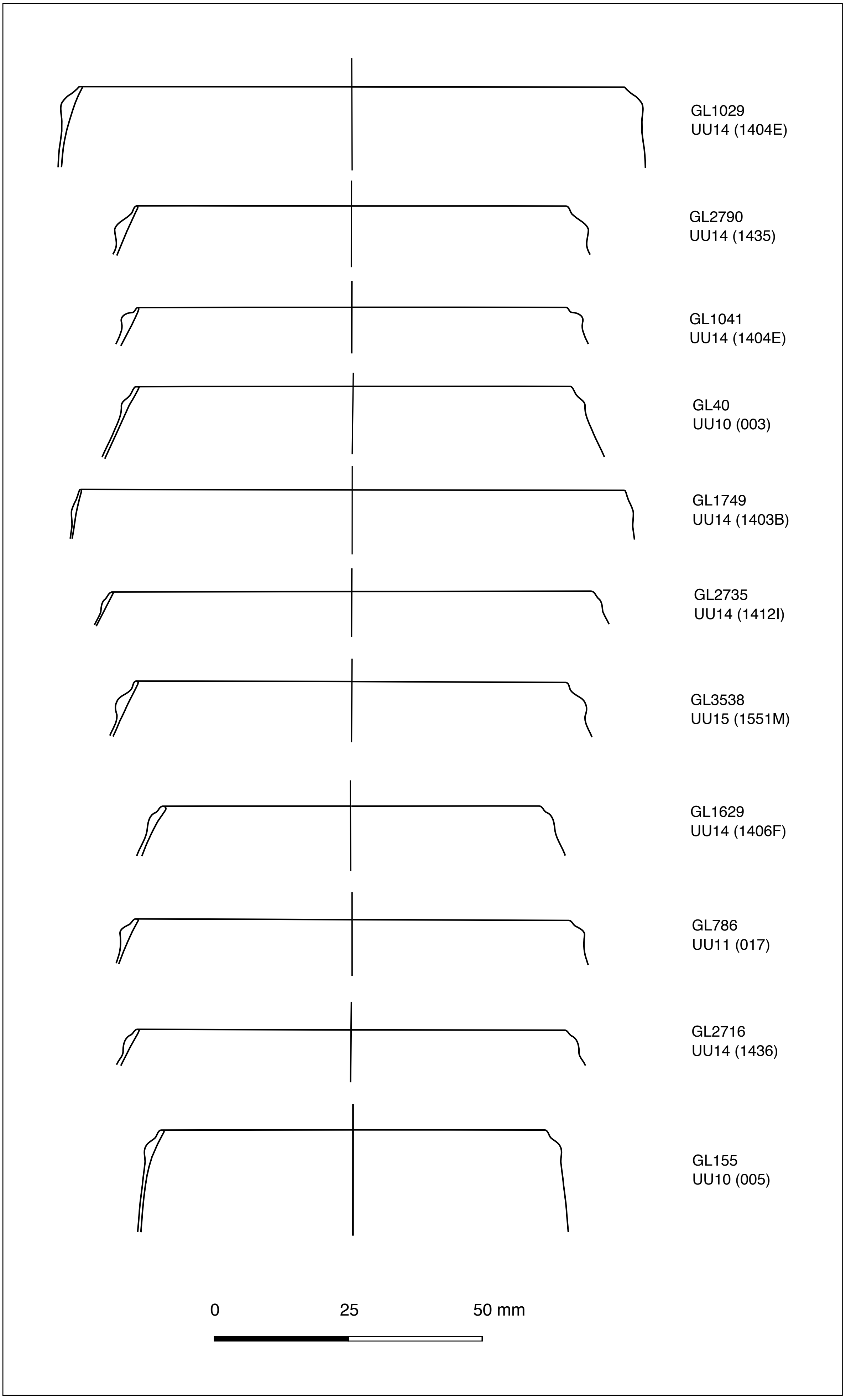


FIG. 3.30. STEPPED RIMS FROM UNGUJA UKUU

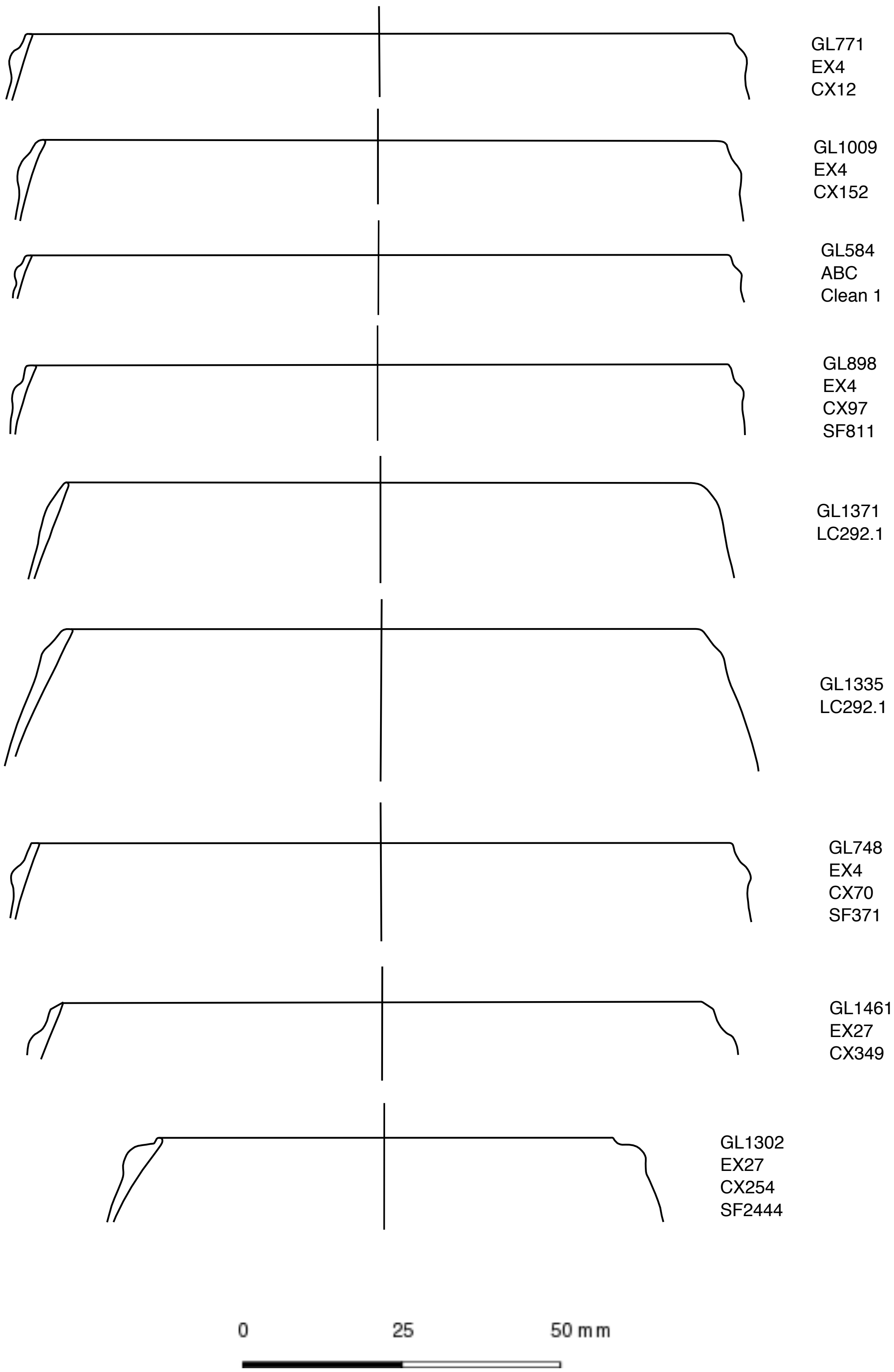


FIG. 3.31. STEPPED RIMS FROM KUWAIT

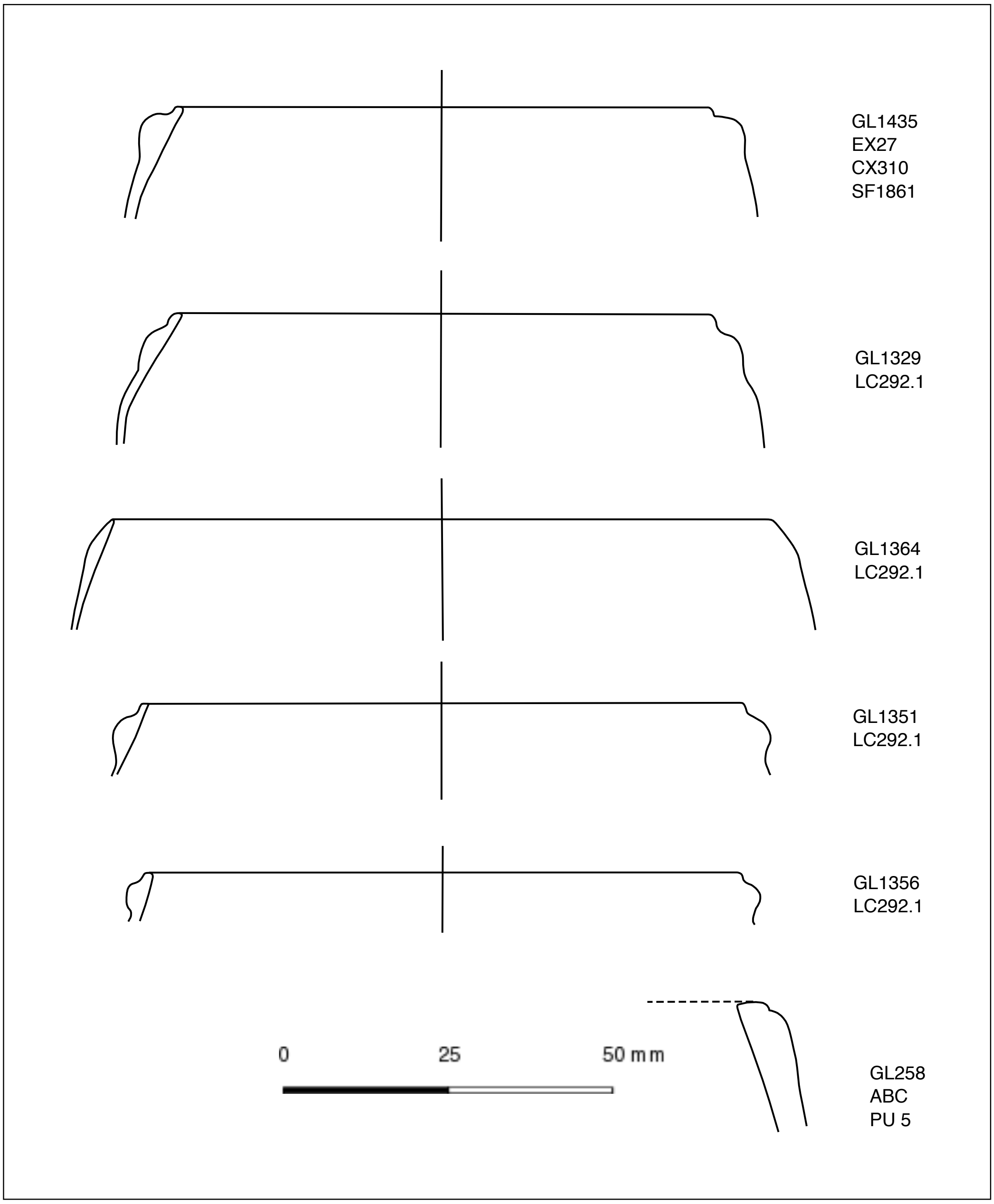


FIG. 3.32. STEPPED RIMS FROM KUWAIT

Several different varieties of rim finishing are present in combination with the step. In the Kuwaiti assemblages most are quite plain, with some rounded (e.g. K-GL1335; K-GL84) some relatively sharp (e.g. K-GL1329; K-GL1302/1435; K-GL1577; K-GL771/748/898/1007/1009) and one finely bevelled (K-GL1461). A similar range of variation is present at Unguja Ukuu, with some bevelled (e.g. U-GL40; U-GL3349), some pointed (e.g. U-GL786; U-GL2245) and some more rounded (e.g. U-GL812; U-GL2295), though the margins between these (and therefore the significance thereof) are fine.

In colour, most of the *stepped rims* from Kuwait are in LGB glass, with single examples of CL, EG and OG glass. Interestingly, the vast majority of the Unguja Ukuu examples have been recorded as CL and OG glass, with smaller numbers of IB, BL and LGB metal. One of the BL fragments from Unguja Ukuu (U-GL2244) possesses *scratch-engraved* decoration (see Fig. 3.89, §3.5.2).

On the whole, *stepped rims* are very well represented within the Early Islamic glassware repertoire. In addition to the aforementioned examples from Nishapur (Kroger 1995: 45, 54-5, nos. 11-12, 34-6), in the Persian Gulf region they can be found at Siraf (Jennings *n.d.*) and Kush (Price & Worrell 2003: 155, fig. 2, no. 11; Worrell & Price 2003: 250-1, fig. 5.1). In East Africa, they are present at Kilwa in Periods Ib and IIIa (Chittick 1974: 397, fig. 153ef) and Shanga (Horton 1996b: 313-14, figs. 234c, 235a). In Iraq examples are known from 8th century layers in Seleucia (Negro Ponzi 1970-71: fig. 51, no. 63) and Nippur (Meyer 1996: 252, fig. 3, nos. 82-6). In Syria, 'Abbasid' examples with flaring sides were found at Qal'at Seman (Dussart 2003: 173, Fig. 2.1). A smaller number of parallels have been identified further afield in the Levant at Yoqne'am (Lester 1996: 204, nos. 10-12, fig. XVII, no. 3), with a weaker possible example from suggested 9th to mid-10th century AD contexts at Caesarea (Pollak 2003: 167, 169, fig. 3.38). A further clue to the dating of this type is found in the material from Unguja Ukuu itself, with the blue fragment with *scratch-engraved* decoration (U-GL2244) typical of the 9th century (see §3.5.2.). Some of the examples from Nippur, which Meyer dates to the late-7th and 8th century but calls Sasanian, possess mould-blown decoration (see §3.5.5.; Meyer 1996: 252, fig. 3, no. 81).

Such rims seem to belong to small to medium-sized open vessels, such as might aptly termed beakers or bowls. Complete examples from Nishapur seem to support this hypothesis (Kroger 1995: 45, 54-5, nos. 11-12, 34-36). Some of the examples from Nippur, which Meyer dates to the late-7th and 8th century but calls Sasanian, possess mould-blown decoration (Meyer 1996: 252, fig. 3, no. 81). In terms of function, these and other open forms may perhaps be considered 'tablewares' most closely associated with acts of consumption and display. The range of rim diameters associated with this type suggests that many examples were small enough to be hand held, though the step may have caused difficulties preventing their use as drinking vessels.

3.2.2. Triangular-beaked rims

The *triangular-beaked rim* is another type that is becoming increasingly recognised as a component of Early Islamic glassware. Such rims have been thickened on the exterior, flattened on top and are internally-beaked, giving a distinctive triangular profile (Fig. 3.33, 3.34, 3.35, 3.36). The technique allows for considerable variation in the prominence of the triangular form. Occasionally, the rim finishing process leaves a faint groove on the interior wall of the vessel just below the top of the rim. Fourteen fragments were found at Unguja Ukuu, with another 14 found in Kuwait (Fig. 3.33).

	Kuwait	**Unguja Ukuu**
No. Fragments	14	14
Rim Diameter (ave.)	80.77 mm	80.71 mm
Rim Thickness at Beak (ave.)	5.34 mm	3.94 mm

FIG. 3.33. SUMMARY OF TRIANGULAR-BEAKED RIMS

In diameter the Kuwaiti examples range from a minimum of 70 mm to a maximum of 90 mm (ave. 80.77 mm). The Unguja Ukuu examples exhibit slightly greater variation in size, with rim diameter ranging from 70-100 mm (ave. 80.71 mm). There is considerable variation in terms of the thickness of the beaked rim. The Kuwaiti examples range from 3.8 mm to 6.7 mm (ave. 5.34 mm), while the Unguja Ukuu examples range from 1.6 mm to 5.7 mm, with an average thickness of 3.94 mm. The Unguja Ukuu *triangular-beaked rims* are thus less prominent than the Kuwaiti examples, though the overall vessels are similar in size. In addition to the internal aspect of the beak, the triangular appearance is often enhanced by the presence of some degree of thickening on the exterior. Among the Kuwaiti material the only exceptions to this are K-GL14 and K-GL1588, while the Unguja Ukuu exceptions consist of U-GL648, U-GL1927/1950, U-GL2476 and U-GL2856. In terms of the finishing process, in Kuwait some have been flattened on top (e.g. K-GL14; K-GL80; K-GL218; K-GL83/233; K-GL234/236; K-GL1588) and others slightly rounded (e.g., K-GL1677/1680/1856). Almost all the Unguja Ukuu fragments have been flattened on top, with the exception of U-GL2099 and U-GL3388 which are again rounded. The aforementioned groove appears on three fragments at Unguja Ukuu (e.g., U-GL2981/3182 and U-GL3388), located just a millimetre or so below the top of the rim. The same pattern is seen among the Kuwaiti material (e.g. K-GL83/233; K-GL1603; K-GL1677/1680/1856), and it is likely that these represent instances where the glassworker neglected to remove any visible traces of the final part of the rim finishing process.

Speaking in terms of a ‘chaîne opératoire’, the *triangular-beaked rim* type is one stage away from the *stepped rim* in that the latter is simply a version of the former which has not been flattened and thus possesses an extended lip above the step. On rare occasions a fragment reveals the transition between the two types. As such, the internal groove that remains visible in a small number of cases seems to relate to the final finishing of the rim, specifically the process of flattening or folding down of the extended lip which characterises the distinguishing stage in the chaîne opératoire between the *stepped rim* and the *triangular-beaked rim*. Why this step was taken in a number of cases but not others is uncertain, perhaps relating simply to more care being taken in the pursuit of a quality final product.

In spite of the close connection between the two types, the *triangular-beaked rim* is less commonly recognised than the *stepped rim*. Other examples of triangular-beaked rims are present in Juma’s Period Ib at Unguja Ukuu (Juma 2004: 124, fig. 7.1.3, no. 2), as well as at Siraf (Jennings n.d.). As with the *stepped rim*, the *triangular-beaked rims* seem to be associated with straight to convex-sided open vessel forms such as might be termed beakers or bowls, along with an associated range of tableware functions. In terms of colour, almost all the Kuwaiti examples are found in LGB glass. The Unguja Ukuu fragments are also mostly found in LGB glass, with smaller number of OG and CL glass. Interestingly, the proportions of these colours differs from that of the supposedly similar *stepped rims*.

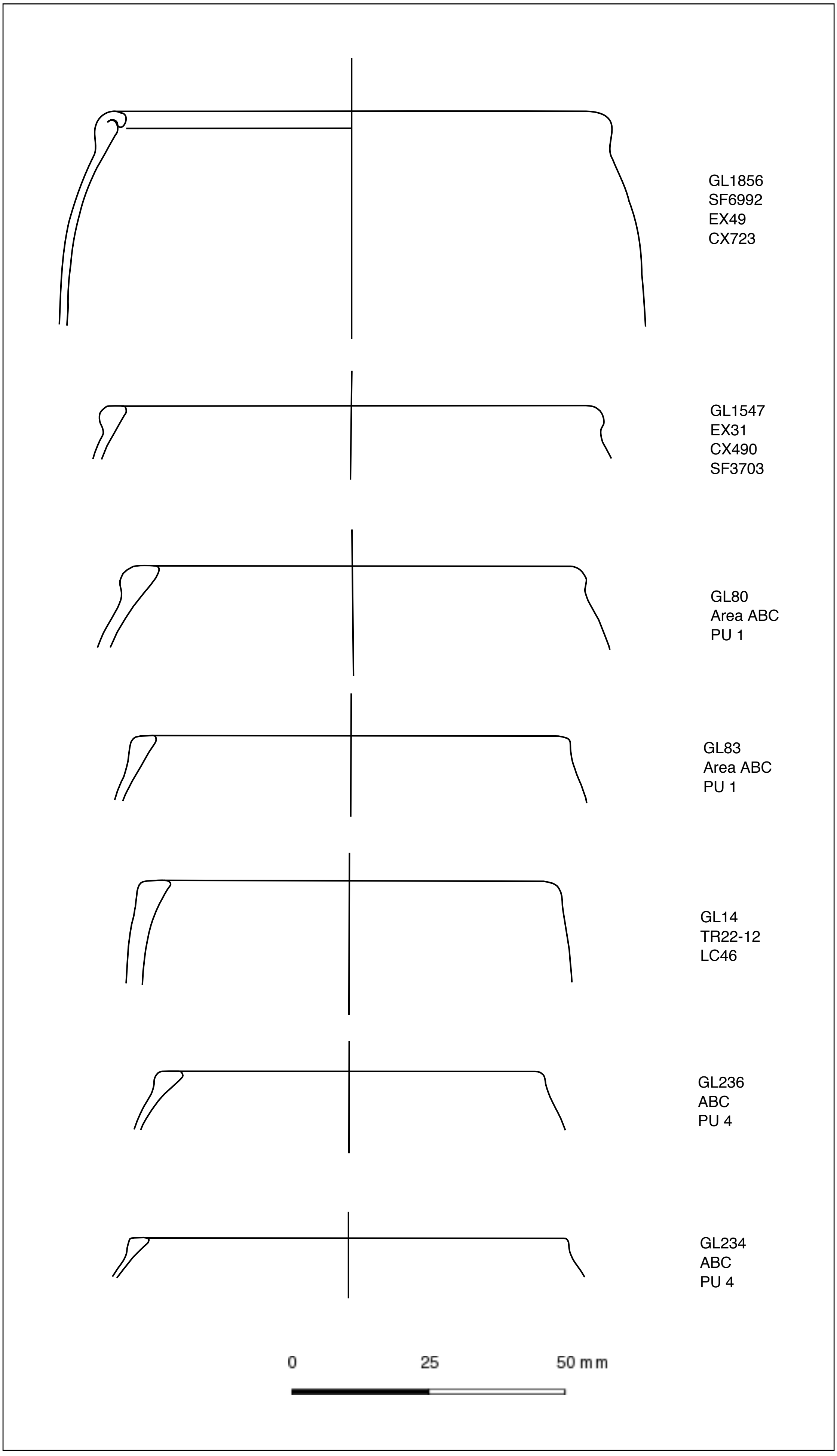


FIG. 3.34. TRIANGULAR-BEAKED RIMS FROM KUWAIT

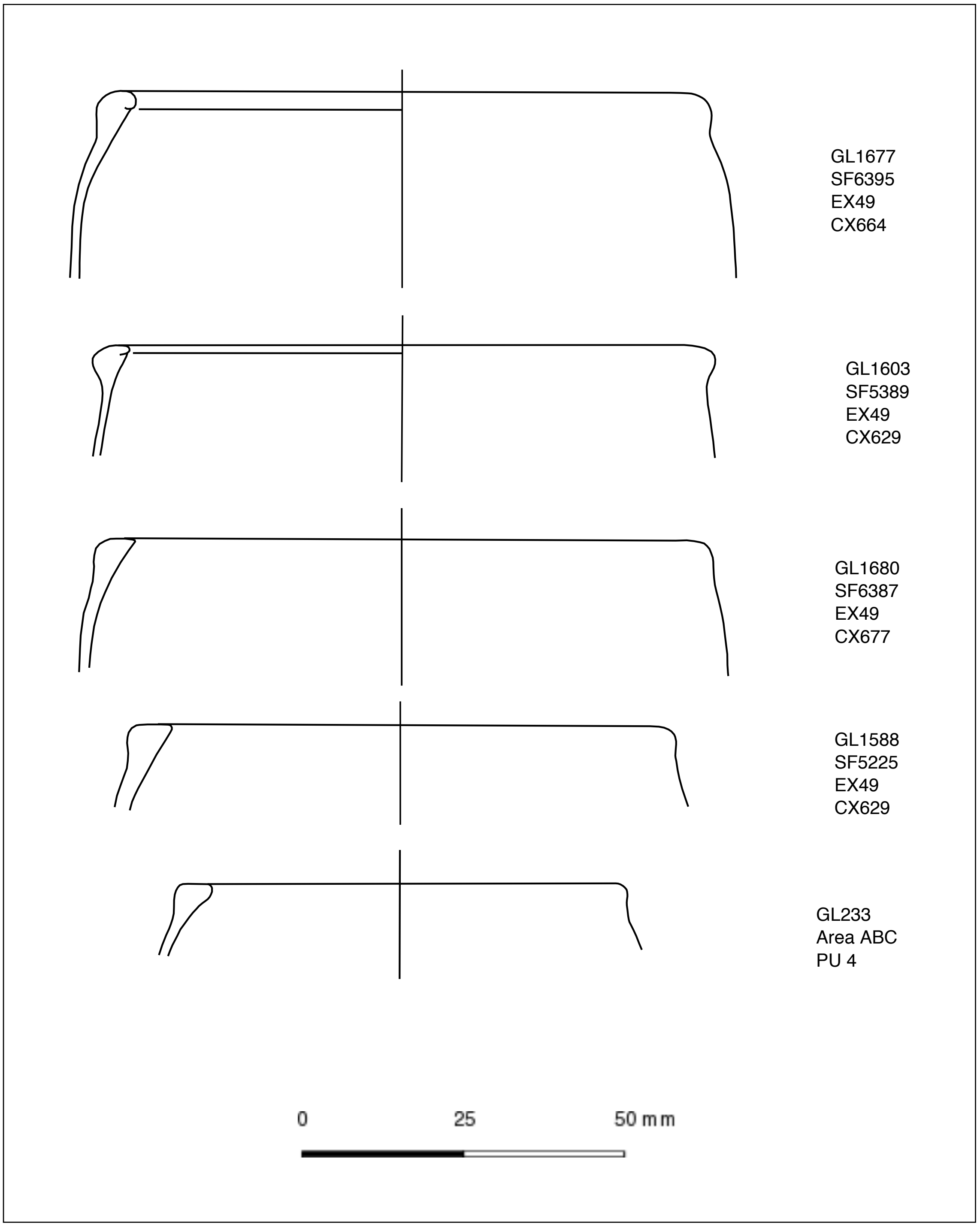


FIG. 3.35. TRIANGULAR-BEAKED RIMS FROM KUWAIT

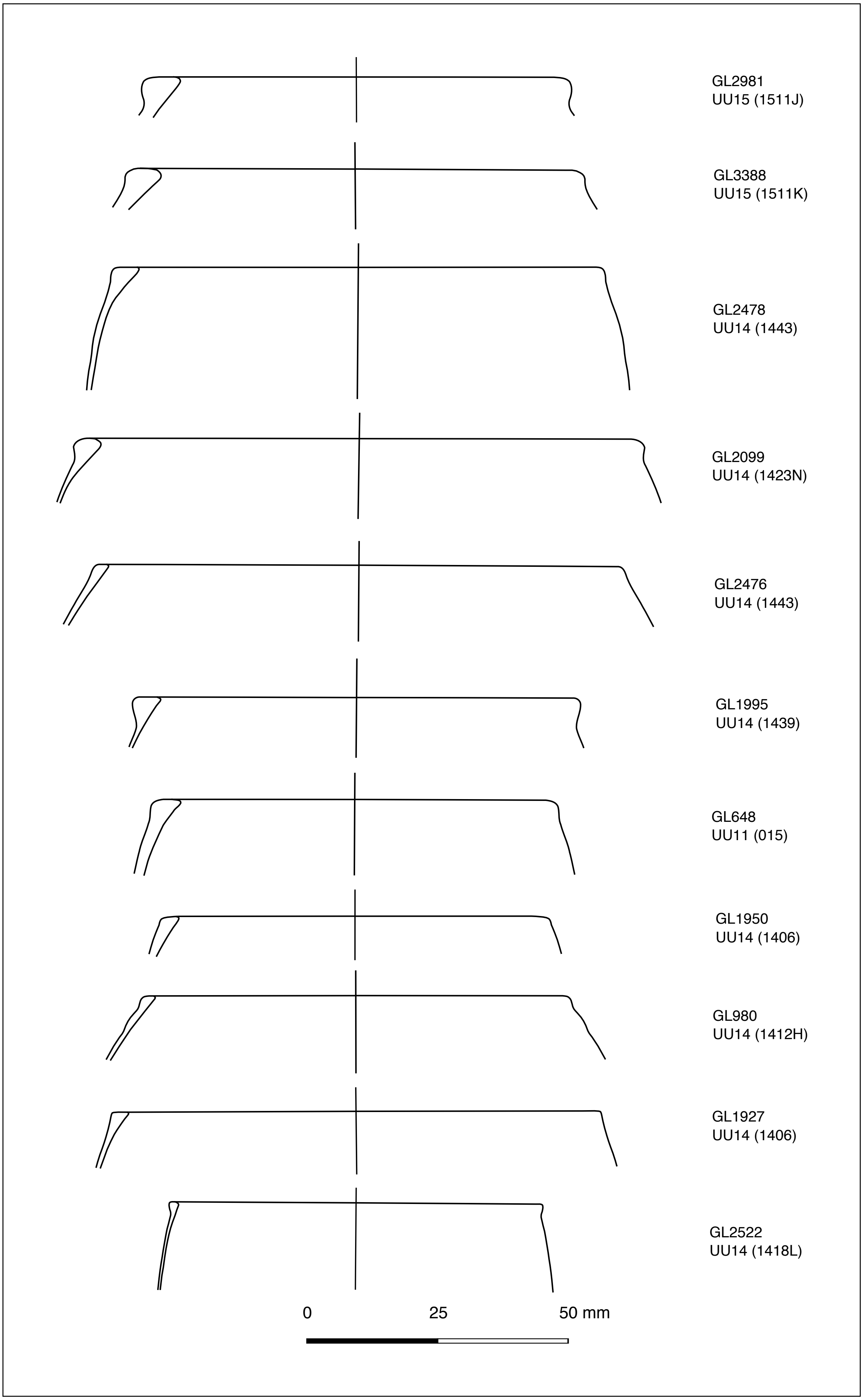


FIG. 3.36. TRIANGULAR-BEAKED RIMS FROM UNGUJA UKUU

3.2.3. Inwards-folded rims

The *inwards-folded rim* is a common technique observed in both the Kuwaiti and Unguja Ukuu assemblages. In appearance the type is highly distinctive, consisting of a rim which has been folded inwards and downwards to meet the internal vessel wall. This procedure leads to a thickened, rounded and slightly inverted rim/vessel mouth, and often creates a thin hollow 'barrel' effect between the surfaces enclosed by the fold. Twenty-one examples of *inwards-folded rims* were found in Kuwait, with seventeen at Unguja Ukuu (Fig. 3.37, 3.38, 3.39, 3.40).

	Kuwait	**Unguja Ukuu**
No. Fragments	21	17
Rim Diameter (ave.)	86.67 mm	98 mm
Fold Length	4.9 - 13.1 mm	3.4 - 9.5 mm

FIG. 3.37. SUMMARY OF INWARDS-FOLDED RIMS

In the Kuwaiti assemblages, the diameter of vessels exhibiting this technique range extremely widely, from 60-120 mm (ave. 86.67 mm). In slight contrast, the fragments with *inwards-folded rims* in the Unguja Ukuu assemblage exhibit less variation, concentrating towards the upper end of the spectrum from 90 to 120 mm in diameter (ave. 98 mm). In the Kuwaiti material, the length to which the rim is folded varies from 4.9 mm to 13.1 mm, however it is not clear whether this has any wider significance. Here a comparison of fold length and diameter suggests, if anything, fold length slightly decreases as diameter increases. It is possible that there is a larger group where the fold extends for around 10 mm, and smaller group extending for approximately 5 mm, however some examples fill the gap and it would perhaps be wiser to consider these as a bimodal distribution at either end of a spectrum. At Unguja Ukuu, the fold length again ranges widely but is slightly less than that of the Kuwait examples, measuring between 3.4 mm to 9.5 mm. Again there appears to be a bimodal distribution with a group around 5-6 mm and a group between 8.5-9.5 mm, yet their remains insufficient evidence to make any suggestion of a link between fold length and rim diameter, and in this case no suggestive patterns of any correlation one way or the other.

Two fragments from Unguja Ukuu exhibit distinctive irregular rims (e.g. U-GL190 and U-GL3535). Both are typical of the type as far as profile and section are concerned, but irregular in plan. U-GL190 has been manipulated into a smooth 'wave' or 'S' pattern, while U-GL3535 has a similar 'wave' but is much more irregular and uneven. In this respect they are not dissimilar to several fragments in the category *plain rims (rounded)*, discussed below (§3.2.6.). At least in the case of U-GL190 the wave pattern is a deliberate effect, but it is unclear from the partial fragment whether it was applied to the entirety of the rim or just a portion. The Kuwaiti fragments of this type are invariably produced in natural LGB colour glass, however the Unguja Ukuu fragments represent a mix of LGB, IB, OG and CL groups. None exhibit any signs of embellishment or decoration other than the the manipulation recognised in relation to U-GL190 and U-GL3534.

Kroger presents a number of convex to straight-sided open vessels with folded rims from supposedly 10th century contexts at Nishapur, however these are folded outwards rather than inwards (Kroger 1995: 44, nos. 8, 9, 10). Indeed it may be that outwards-folded varieties are slightly more common across the Early Islamic glass tradition as a whole (e.g. Bat Galim - Pollak 2008: 56), yet none have been found in the Kuwait or Unguja Ukuu assemblages. Both inwards and outwards-folded rims are known from Siraf, where they are found in association with both flaring, convex and straight-sided 'bowls', though the outwards-folded variety appears more common (Jennings n.d.). At 7th-8th century Nippur, Meyer identifies open vessels with *inwards-folded rims*, some with moulded decoration (Meyer 1996: 249-50, fig. 2, nos. 41-53, 56-7). At Shanga only outwards-folded rims are found (Horton 1996b: 314, fig. 235r-u).

In terms of overall vessel form, *inwards-folded rims* seem to be associated in the main with straight to convex-sided open vessels, such as those commonly termed beakers or bowls. However, unfortunately, the join of the fold appears to represent a weak spot on such vessels and the profile is rarely preserved below this point. Regarding the irregular-shaped fragments, U-GL190 and U-GL3535, it is unclear whether these are misshapen or indeed represented bowls with 'wavy' rims, trefoil or quatrefoil vessels, or even the spouts of jugs or ewers such as is seen on an example in the Khalili collection (Goldstein 2004: 80-1, no. 78).

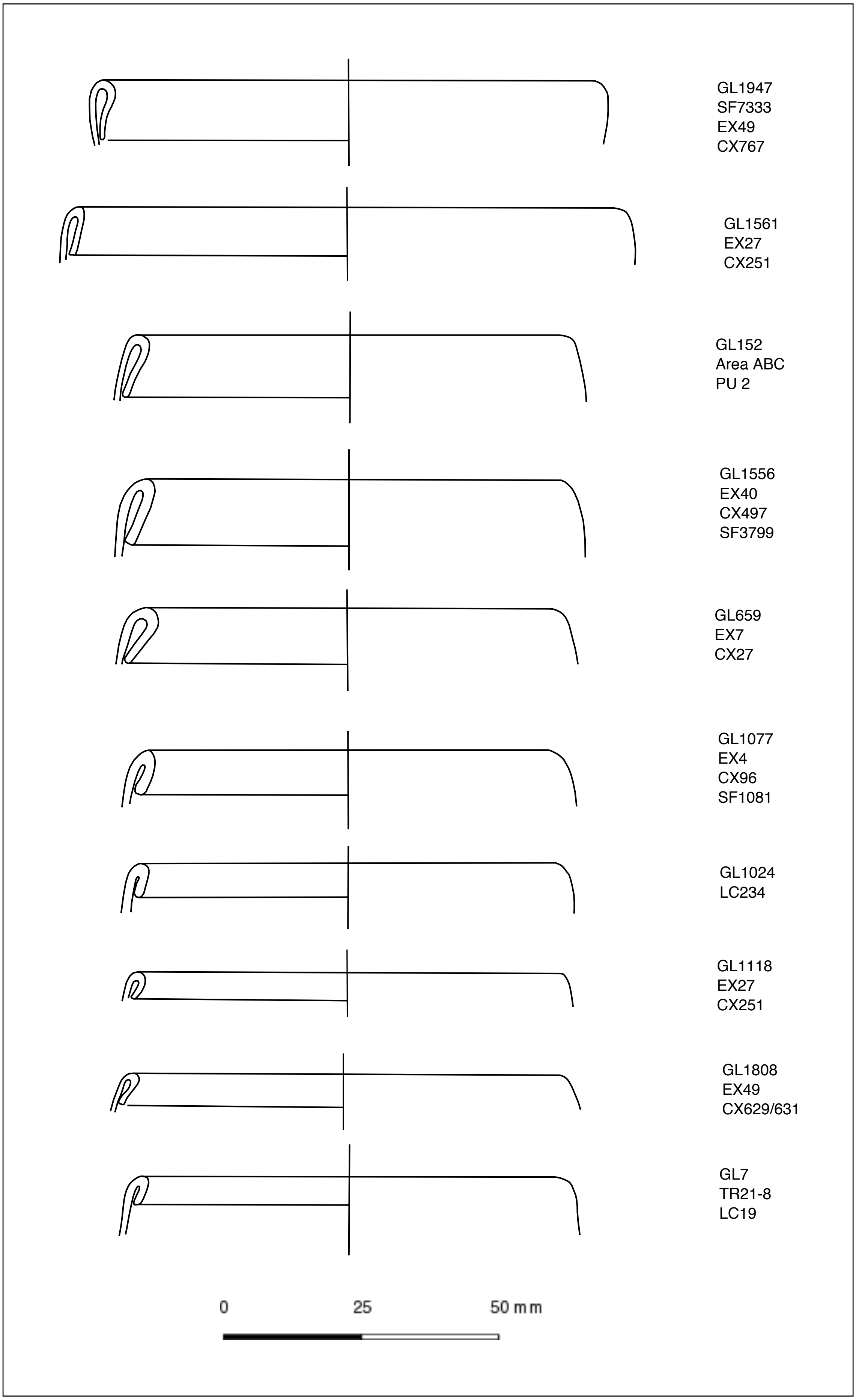


FIG. 3.38. INWARDS-FOLDED RIMS FROM KUWAIT

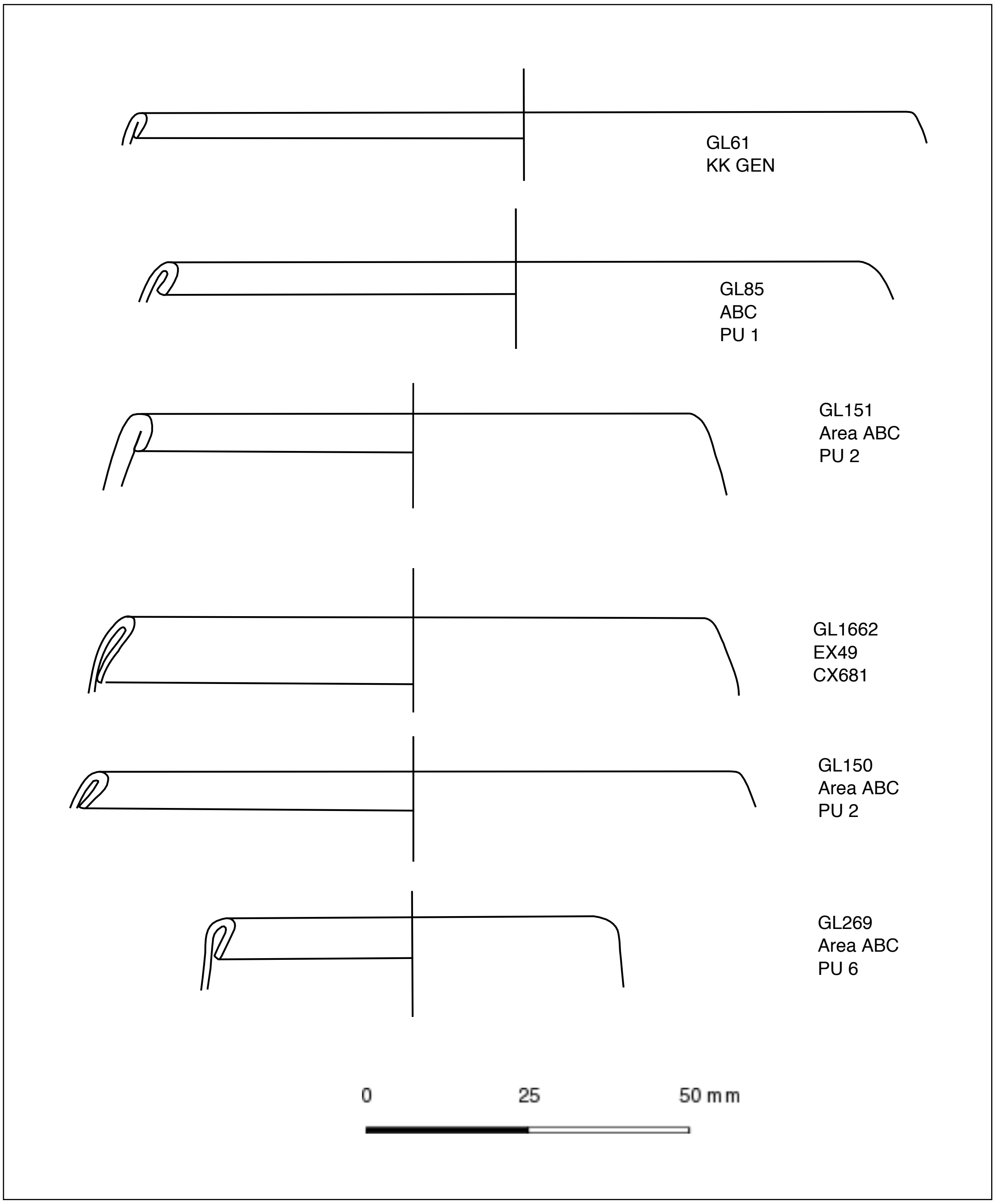


FIG. 3.39. INWARDS-FOLDED RIMS FROM KUWAIT

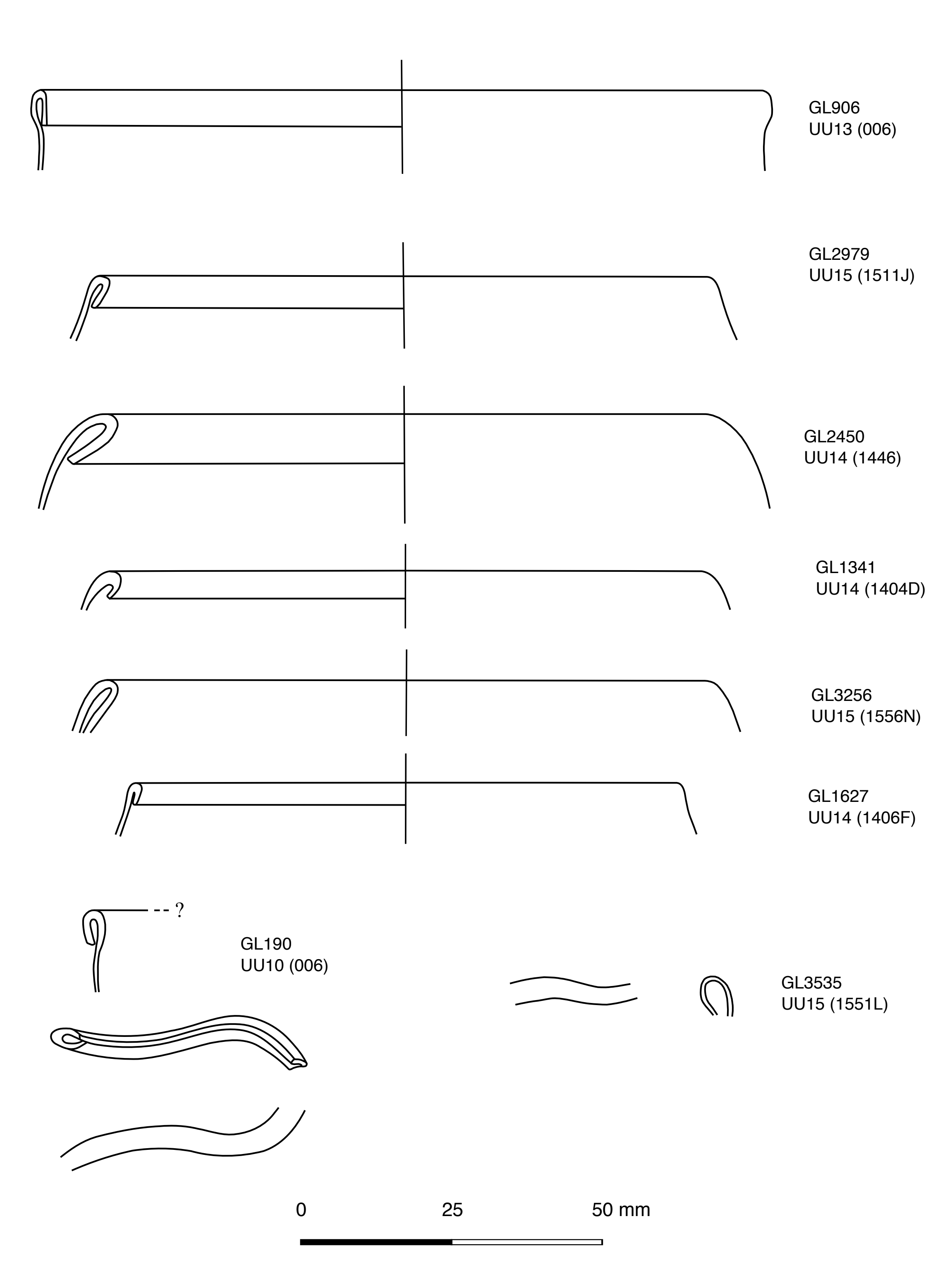


FIG. 3.40. INWARDS-FOLDED RIMS FROM UNGUJA UKUU

3.2.4. Rolled-in rims

Rolled-in rims are a type defined by the presence of a slightly turned-in mouth, creating a thickened rim. As with the closed examples of this technique of rim finishing, the process of rolling is far too subtle to be considered fully folded. Four fragments from Kuwait are matched by four from Unguja Ukuu. Regarding the Kuwaiti examples, in diameter, the rims range from 80-110 mm. The *rolled-in rims* from Unguja Ukuu range in diameter from 70-150 mm. The larger fragment, U-GL2616, obviously belongs to a vessel of considerable size, and is something of an anomaly within this type and indeed the assemblage as a whole (Fig. 3.41, 3.42).

	Kuwait	**Unguja Ukuu**
No. Fragments	4	4
Rim Diameter (range)	80 - 110 mm	70 - 150 mm
Roll Thickness (range)	3.6 - 5.3 mm	-
Roll Length (range)	2.3 - 4.9 mm	-

FIG. 3.41. SUMMARY OF ROLLED-IN RIMS

While all sharing a similar working technique and idea, there is some variation in the thickness and prominence of the roll, owing to variations in the thickness of the glass metal. In Kuwait, the prominence of the roll varies from a minimum of 3.6 mm thick (K-GL149) to a maximum of 5.3 mm (K-GL1230). In length, the variation is between 2.3 mm (K-GL149) and 4.9 mm (K-GL1230). Interestingly, the most prominent and rounded example of a *rolled-in rim* in Kuwait (K-GL1230) is also the smallest in terms of rim diameter (80 mm). This pattern is again repeated at Unguja Ukuu, whereby the fragment with the large diameter, U-GL2616, possesses the thinnest roll. One solution to this may be that the glassworker started with a similar quantity of glass, meaning that those vessels which are blown to a wider diameter will by necessity possess thinner walls, and thus result in a thinner fold. At Unguja Ukuu a further anomaly exists in that in all cases but that of U-GL2616, the roll length is normally less than the roll thickness.

Crude *rolled-in rims* have been identified in association with cups and bowls of a similar diameter in the Levantine world as at Caesarea, where they are dated to the late Umayyad to early Abbasid period, as well as at Ramla, Hamat Gader and Fustat (Pollak 2003: 167-168, fig. 2.21-22). A large number of examples of the general type are suggested from Qal'at Seman, though none represent very close parallels (Dussart

2003: 174-175, fig. 3.2-3, fig. 4.1-2). The different vessel sizes suggest, as with any similar vessel, a range of possible functions. Indeed, Pollak notes that, at Fustat, they have been considered ‘measuring vessels’, though exactly what this rather specific interpretation is based on is unclear. The inwards roll creates an internal lip which would make these forms not particularly well suited to drinking, and indeed the examples in excess of 100 mm are perhaps too big to be hand-held with ease. Again some form of tableware seems the most likely practical function. The Kuwaiti fragments are all of LGB glass while the Unguja Ukuu fragments exhibit IB and OG metals.

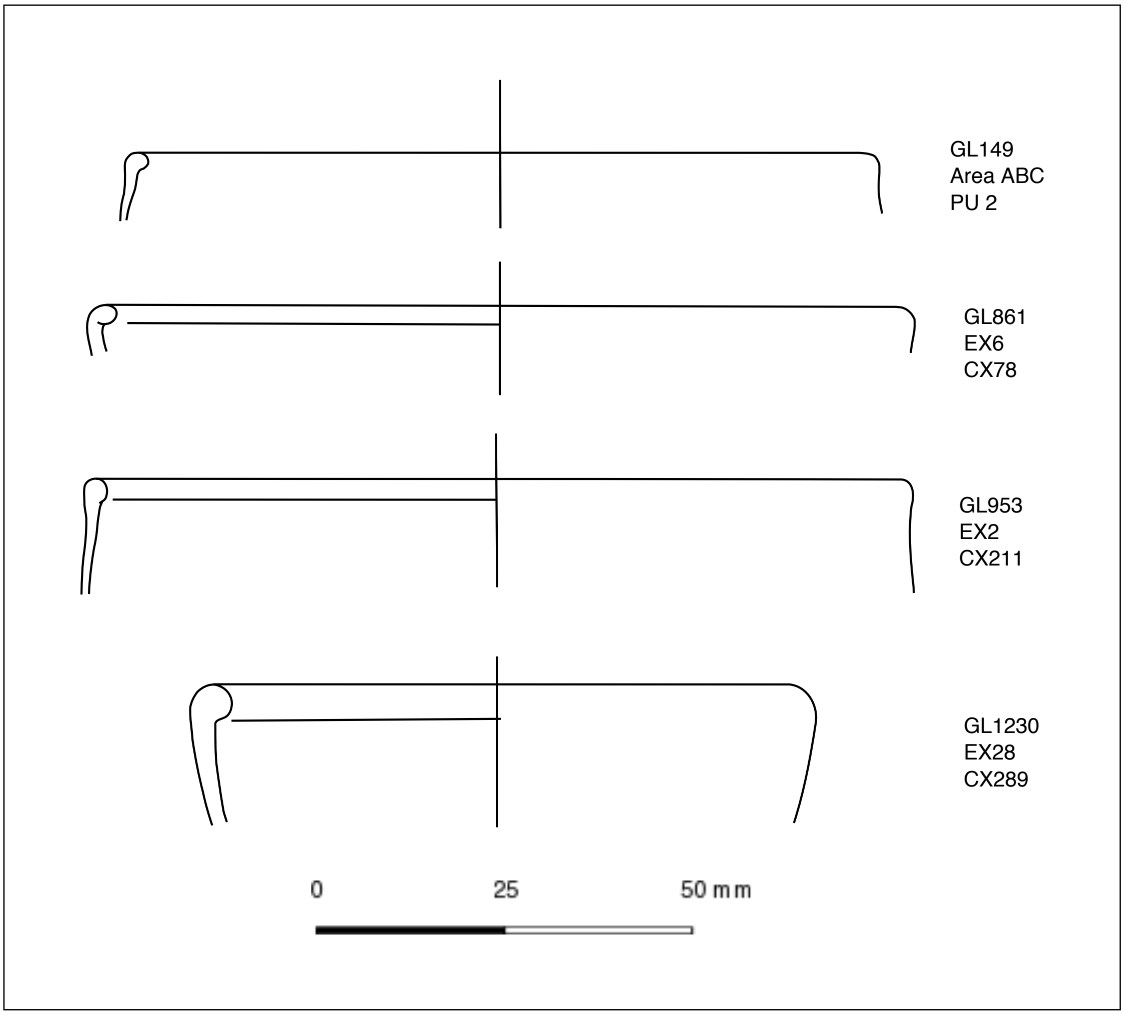


FIG. 3.42. ROLLED-IN RIMS FROM KUWAIT

3.2.5. Flaring-sided vessels

Flaring-sided vessels are defined by the presence of little more than a gently flaring profile. The *flaring-sides* are straight in trajectory, and culminate in relatively plain, if not slightly thickened and rounded rims. Both the Kuwaiti examples possess this typical flaring profile, though these are slightly different in each case, while the single fragment from Unguja Ukuu also fits this brief. The Kuwaiti fragments both measure 110 mm in diameter, and are of a similar thickness at the rim, 2.3-2.5 mm, with the rims in question relatively plain and rounded. Regarding the Unguja Ukuu fragment, U-GL3338 measures 110 mm, and possesses a relatively plain rim, 1.3 mm thick, which is rounded on the exterior and slightly pointed on its internal face (Fig. 3.43, 3.44, 3.45).

	Kuwait	**Unguja Ukuu**
No. Fragments	2	1
Rim Diameter	110	110

FIG. 3.43. SUMMARY OF FLARING-SIDED VESSELS

In terms of decoration, vessels with flaring-sided profiles may be associated with subtle grooves or ridges running in horizontal parallel lines below the rim. Kroger notes this feature in relation to a near identical form at Nishapur, placing them in his default 10th century context and referring to the presence of “numerous horizontal grooves from tooling…” (Kroger 1995: 48-50, nos. 19-25). The single fragment of this type from Unguja Ukuu, U-GL3338, reveals two subtle horizontal marks (1.4 mm apart) running below yet parallel to the rim (2.5 mm below), reminiscent of those mentioned by Kroger, along with a third further down the vessel profile (11.2 mm below the rim). Several broadly similar examples without ridges can be seen at Nippur, probably supposedly late 7th-8th century deposits (Meyer 1996: 252, fig. 2.88, 95, 99). A thicker and more flaring example is dated to the mid-8th century at Caesarea, where it is suggested as a new introduction (Pollak 2003: 166, fig. 1.19). As with the other rim types associated with open vessel forms, it is difficult to go further than ascribe these fragments to the general category of bowls and thus to invoke ideas of the practical and social functions that such vessels connote.

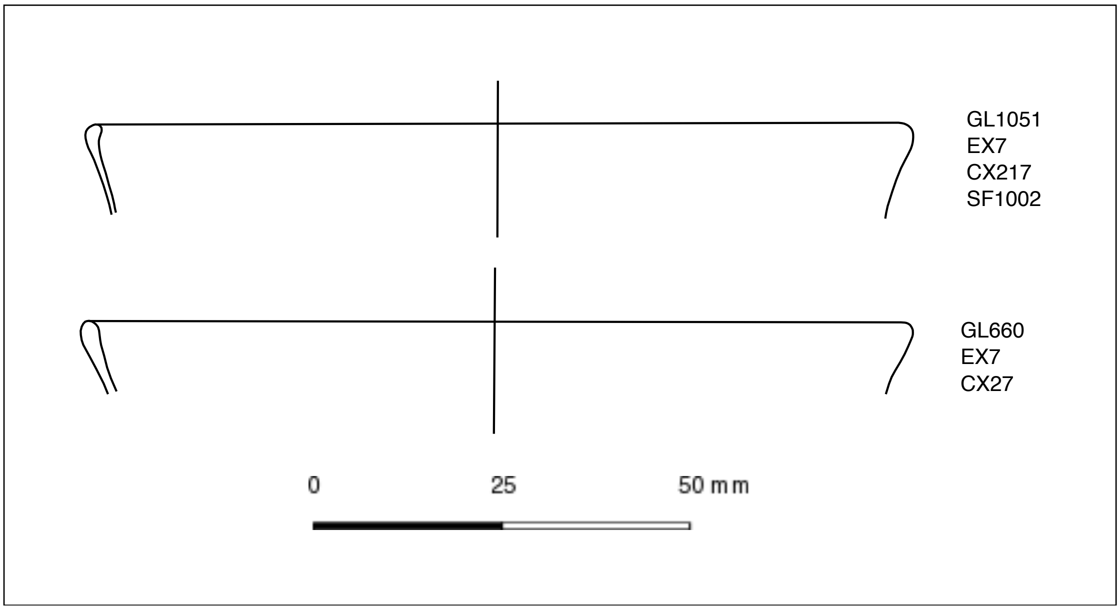


FIG. 3.44. FLARING-SIDED VESSELS FROM KUWAIT

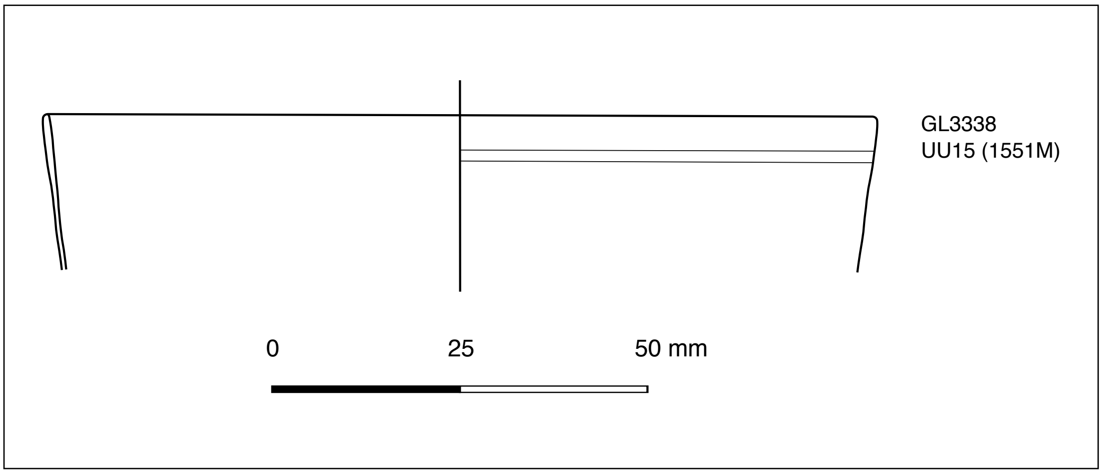


FIG. 3.45. FLARING-SIDED VESSEL FROM UNGUJA UKUU

3.2.6. Plain rims (rounded)

This type of rim is relatively plain, slightly thickened and rounded, and is often slightly inverted. It is most commonly associated with open vessel forms with an 'S' shaped or convex body profile, and is exclusively found in a distinctive pale IB glass. Otherwise there is little distinctive about this rim type, and it is hard to identify parallels at other sites based on published line-drawings alone. While there tends to be considerable variability in rim diameter in other respects this type remains remarkably standardised. Whereas just a single fragment was identified in Kuwait, this is the most common type at Unguja Ukuu with 142 examples (Fig. 3.46, 3.47, 3.48, 3.49)

The single Kuwaiti fragment, K-GL1363, is estimated at 100 mm diameter, and possesses a typical rim and profile. Evidence of considerable variability within this type thus comes from the Unguja Ukuu assemblage, where the 142 *plain rims (rounded)* range in diameter from 60-120 mm, averaging around 80.89 mm. As such, the smallest of the original vessels would have been around half the diameter of the largest. There is also considerable variation evidence in the thickness of these fragments at the rim, from 0.6 mm to 3.1 mm.

	Kuwait	Unguja Ukuu
No. Fragments	1	142
Rim Diameter (ave.)	100 mm	80.89 mm
Rim Diameter (range)	100 mm	60 - 120 mm
Rim Thickness (range)	-	0.6 - 3.1 mm

FIG. 3.46. SUMMARY OF PLAIN RIMS (ROUNDED)

In general, adherents to this type are closely standardised. One fragment, U-GL2157, is typical in profile but in plan takes a rather strange wave or undulating form. Observation of the body of the fragment reveals impressions which suggest deliberate manipulation or tooling to create such an impression, though it is difficult to be certain. A question thus arises, did this belong to the same kind of vessel as the others of this type, or another form entirely? In addition to highly standardised rim shapes and body profiles, there is equally high standardisation in colour groups, with every single fragment produced in IB glass. No decoration is directly associated with this rim type, however at Unguja Ukuu body fragments which share the relevant colour group are known to have been widely decorated, particularly according to the *pinched* technique of tooling (see §3.5.6.).

Owing to the level standardisation in metal of the vessels associated with *plain rims (rounded)*, and the high degree of non-dimensional standardisation in the rims themselves, a reasonable argument can be made that they share a common point of origin. That said, another consequence of the combination of a relatively plain profile and specific metal is that it is difficult to find specific, especially based on line-drawings alone. While similar-sized open vessels with plain rims can be identified at a large number of sites, it is quite difficult to tell whether these are of the exact form/metal combination identified here. The best parallels seem to be found at Siraf (Jennings n.d.), and also within East Africa. An open vessel with an identical metal is present at

Tumbe (Fleisher & LaViolette 2013: 1157-8, fig. 4a-b), while contemporary matches of form can be found in Juma's Unguja Ukuu material (Juma 2004: 124, fig. 7.1.3, no. 1). Others have been dated at Shanga to AD 800-1000 (Horton 1996b: 313-14, figs. 234-35), at Kilwa to Period Ia/Ib (Chittick 1974: 397, fig. 153b-c), and possibly Manda (Morrison 1984: pg. 161, fig. 127a).

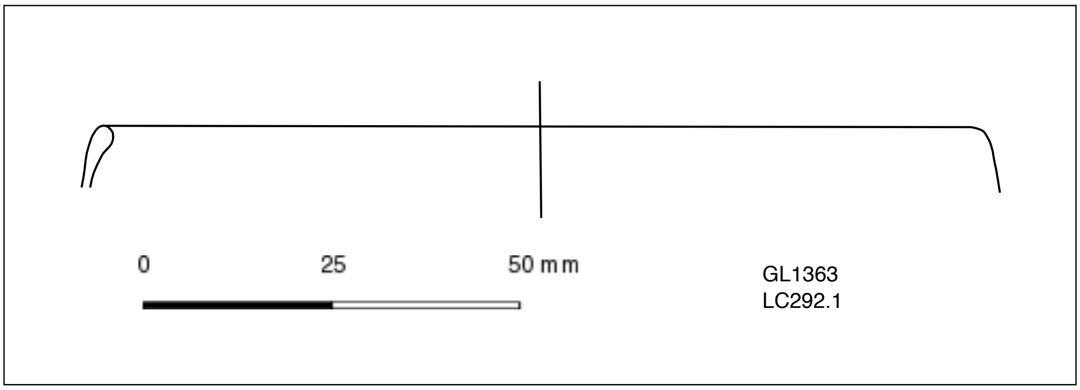


FIG. 3.47. PLAIN RIM (ROUNDED) FROM KUWAIT

Most of the examples identified seem to be in the form of basic beakers or bowls of a similar size to that identified above. This predicted form and range of diameters suggests that such rim types could have been associated with vessels which filled a wide variety of functions, ranging perhaps from drinking and eating to serving and display. Most, but not all, are small enough to have been held in hand. One interpretation is that this style of vessel came in a range of sizes and were intended as multi-purpose items, something of the equivalent of a 'matching-set'. It is suggested later in thesis that this type may represent a 9th century AD type, owing to its distribution in potentially late contexts in Kuwait, widespread presence at Unguja, and association with IB glass (see §6.2.2.4).

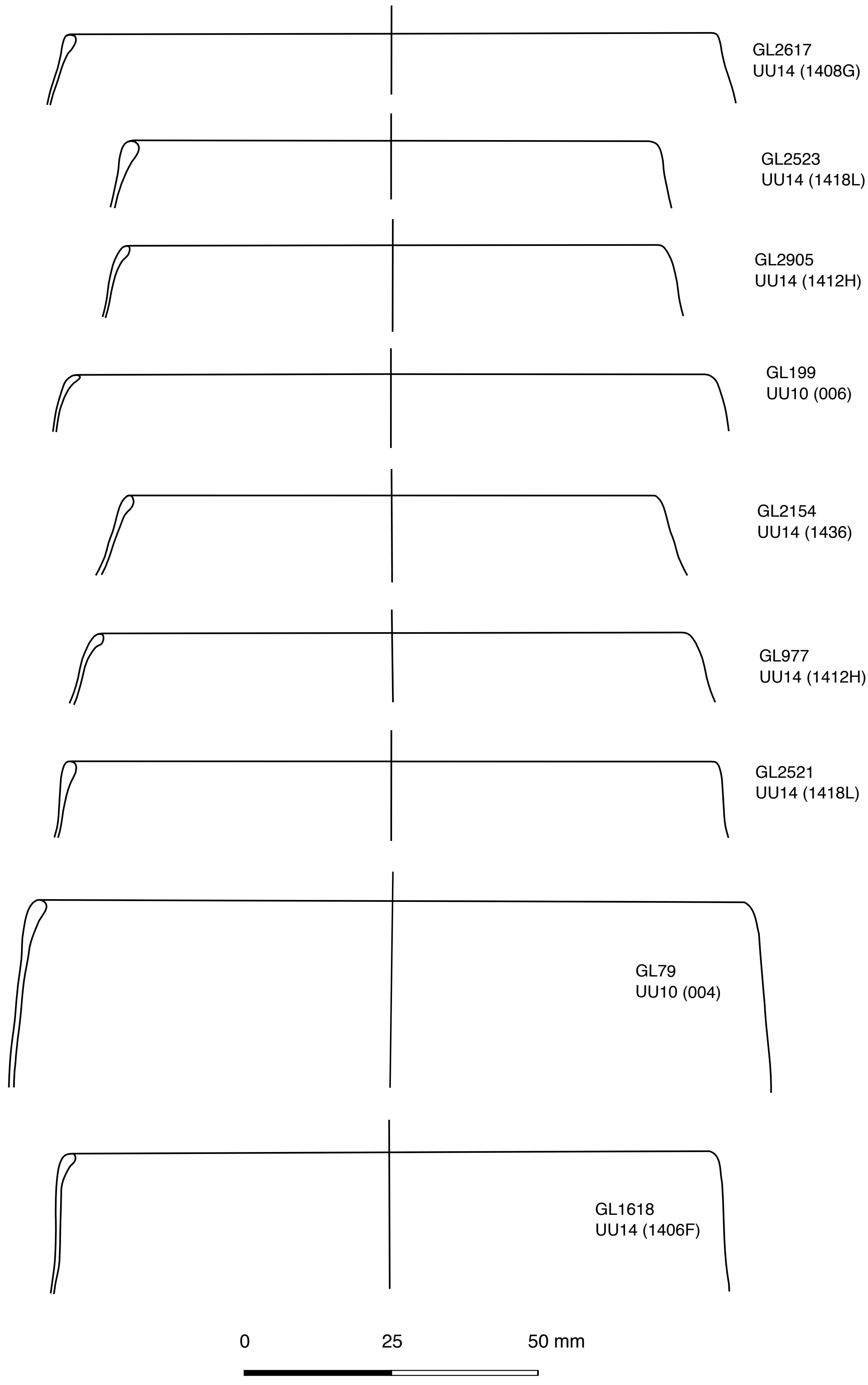


FIG. 3.48. PLAIN RIMS (ROUNDED) FROM UNGUJA UKUU

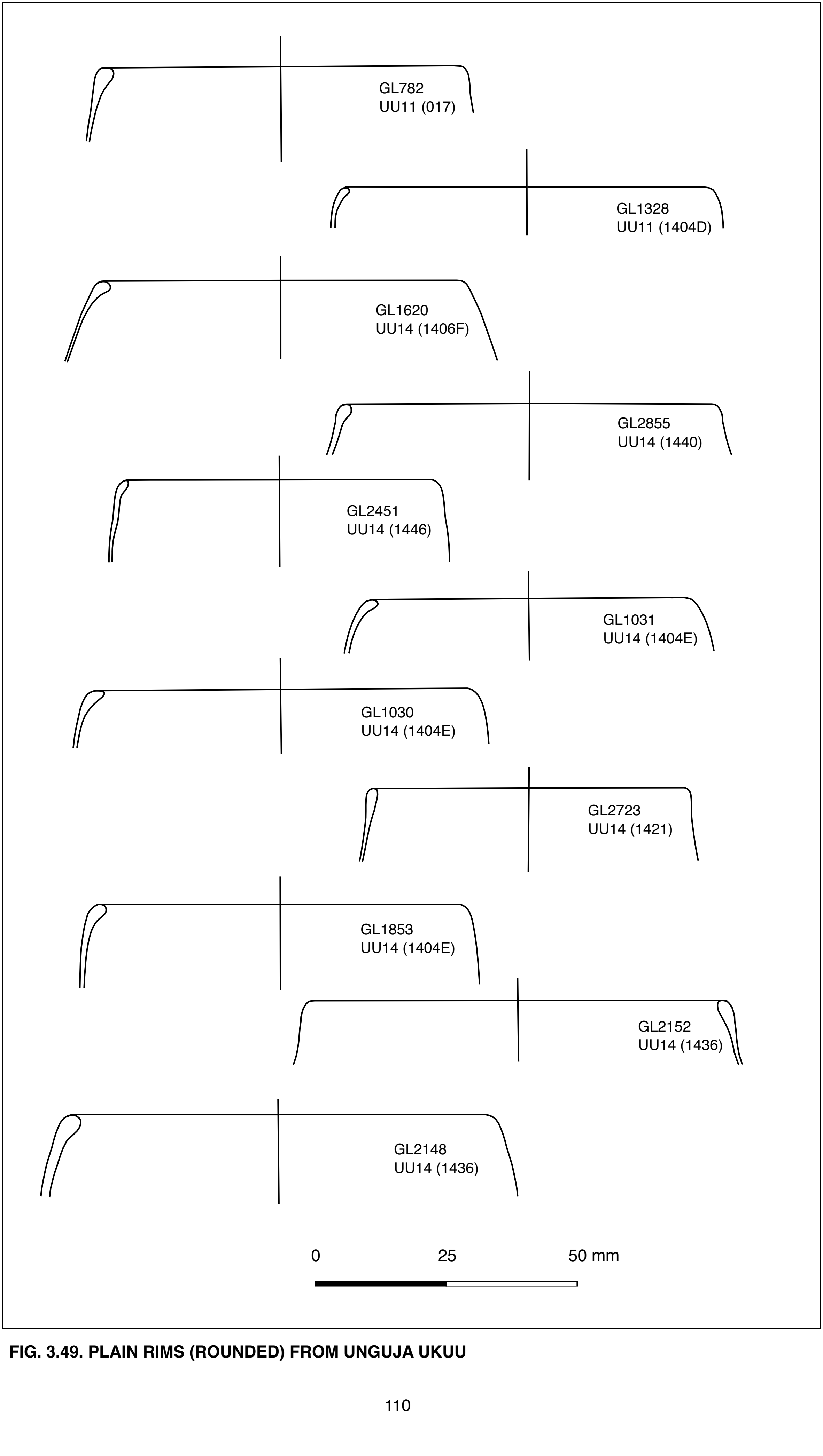


FIG. 3.49. PLAIN RIMS (ROUNDED) FROM UNGUJA UKUU

3.2.7. Plain rims (thick)

The type *plain rims (thick)* represent something of an umbrella category, consisting of a range of relatively thick plain rims which are otherwise nondescript. Each is relatively unique, whether in rim profile or in glass metal, however it was deemed preferable to group them together under this type rather than treating all the fragments individually. The unique characteristics of each fragment goes to demonstrate the diversity introduced into the glass assemblages by these basic open forms. The category is primarily distinguished in relation to a sister type, *plain rims (fine)*, based on size alone. Altogether, eight such fragments were identified in Kuwait, compared to just five from Unguja Ukuu (Fig. 3.50, 3.51, 3.52, 3.53).

	Kuwait	**Unguja Ukuu**
No. Fragments	8	5
Rim Diameter (range)	110 - 150 mm	70 -160 mm

FIG. 3.50. SUMMARY OF PLAIN RIMS (THICK)

As well as thick in terms of glass metal, such rims seem to have belonged to vessels relatively wide in diameter. The Kuwaiti *plain rims (thick)* range in diameter from 110 mm to 150 mm, while those from Unguja Ukuu also belong to large vessels, though exhibit greater variation than their Kuwaiti parallels, ranging in diameter from 70-160 mm. As indicated above, there is an element of variety in the specific profile of the rims when studied closely. K-GL60 is almost bevelled in appearance, ending in a thin point, while K-GL1882 is rounded and slightly inverted in relation to the trajectory of the side-walls. Most of the fragments, however, are simply rounded and otherwise plain (e.g. K-GL62, K-GL1382, K-GL1207, K-GL1492, K-GL1951, K-GL278). The rims from Unguja Ukuu are equally diverse in their finishing, with rounded (e.g. U-GL911/923) and more pointed examples (e.g. U-GL2586 and U-GL2980). Fragment U-GL1741 is somewhat unusual, with its irregular rim plan making it difficult to measure, while it also possesses an irregular external 'lip' on the rim. At both sites, the range of colours includes LGB, CL and OG glass.

As with most of the open vessels, preservation is extremely poor, with only the very upper part of the vessels surviving. As such it remains difficult to say anything concrete regarding overall vessel form, other that to highlight the fact that these fragments for the most part belong to exceptionally large open vessels. As such, regarding the function of vessels associated with *plain rims (thick)*, it is difficult to go beyond suggesting ideas surrounding tablewares, acts of consumption and of display. So to is it difficult to identify parallels, this being a non-specific type.

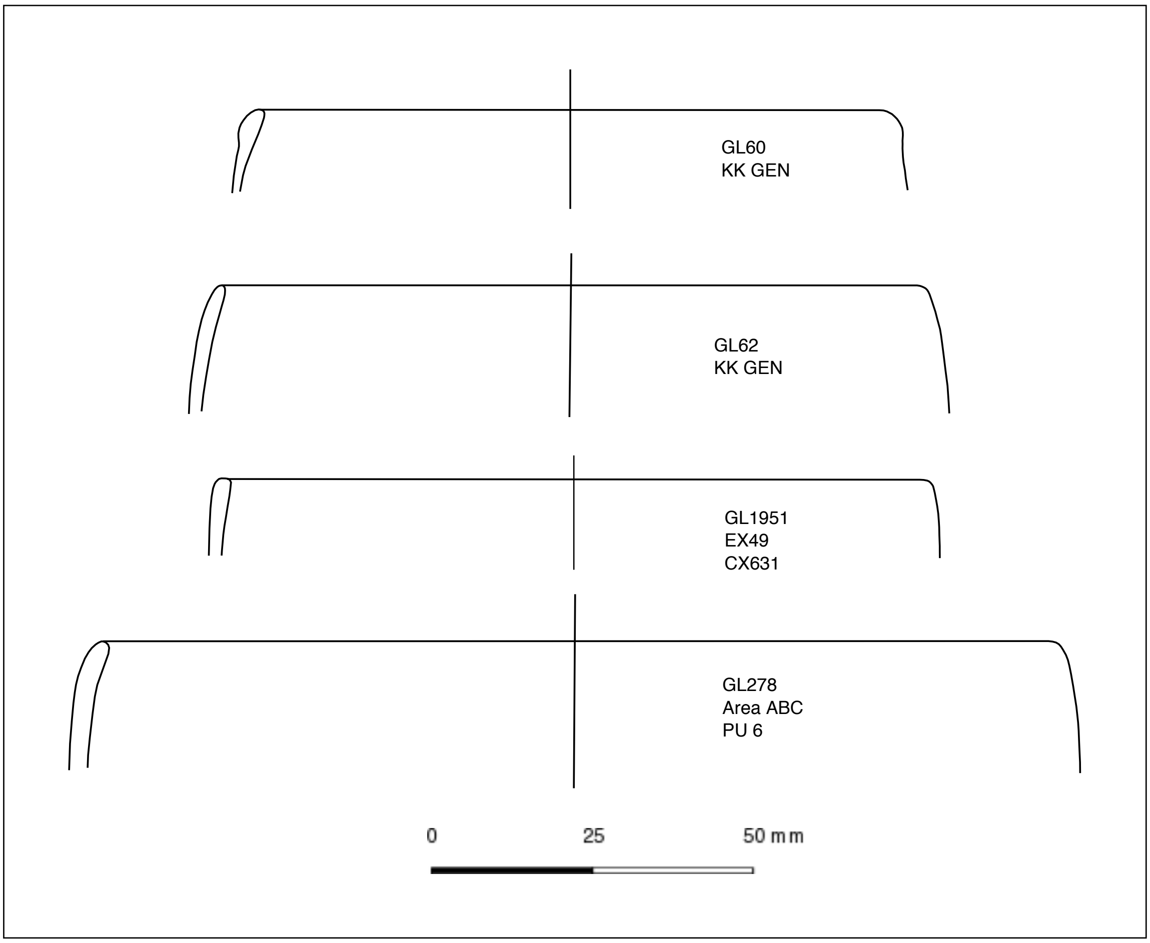


FIG. 3.51. PLAIN RIMS (THICK) FROM KUWAIT

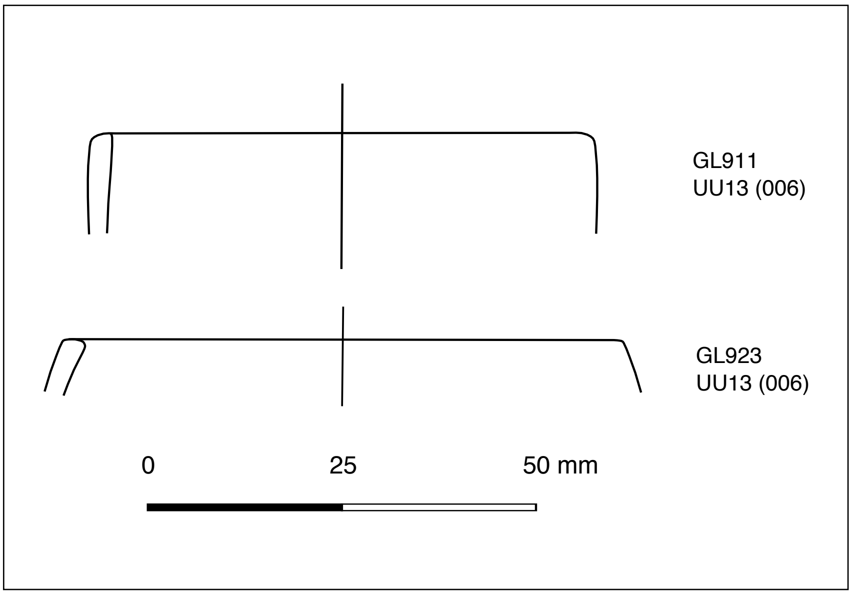


FIG. 3.52. PLAIN RIMS (THICK) FROM UNGUJA UKUU (NARROW)

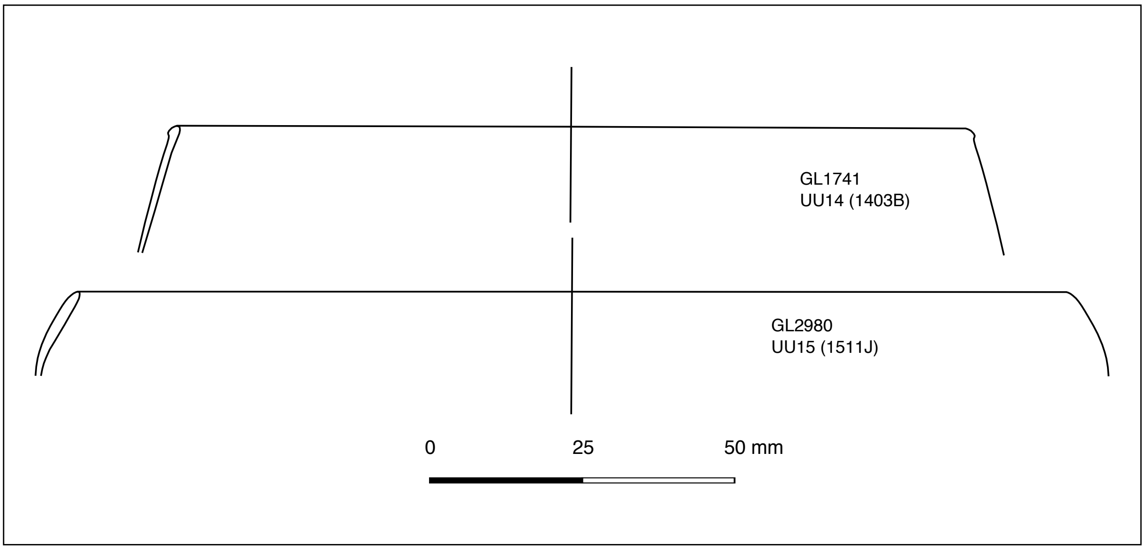


FIG. 3.53. PLAIN RIMS (THICK) FROM UNGUJA UKUU (WIDE)

3.2.8. Plain rims (fine)

Another 'umbrella' category, *plain rims (fine)* are of a type defined by the combination of thin-walled bodies, normally less than 1 mm thick, with generally straight-sided vertical walls and fine, almost pointed rims. Such rims are so fine that there is little space for detail, and few are thickened or embellished in any way. Of all the types defined by this study, this one is the most problematic in terms of the question whether to 'lump or to split'. There is little to link many of these fragments other than their fineness, general range of diameter and lack of other distinguishing detail. However the alternative, to consider them all as individuals, is equally unappealing. As such they are 'lumped' here and categorised on the basis of their opposition to the above type of plain (thick) rims. The 35 fragments from Kuwait compare with 55 examples from Unguja Ukuu (Fig. 3.54, 3.55, 3.56, 3.57)

	Kuwait	Unguja Ukuu
No. Fragments	35	55
Rim Diameter (range)	90 - 140 mm	50 - 100 mm

FIG. 3.54. SUMMARY OF PLAIN RIMS (FINE)

In regard to those among the Kuwaiti assemblages there is a big range of diameters, from a minimum of 90 mm to a maximum of 140 mm. The *plain rims (fine)* from Unguja Ukuu are somewhat smaller than the Kuwaiti examples, ranging from 50 mm to 100 mm in diameter, averaging 74.88 mm. As mentioned, all of the unique vessels represented are slightly distinct. Among the Kuwaiti material, some are slightly thicker on the exterior of the rim (e.g. K-GL640, K-GL1003), while others narrow to become almost pointed (K-GL1675). Some are plain and rounded (K-GL1913), while others are almost angular (K-GL1391-1419). At Unguja Ukuu, a similar variety of distinct rim finishes can be observed, from pointed (e.g. U-GL1750, U-GL3541, U-GL2844) to rounded (e.g. U-GL2660/2661, U-G2403, U-GL3539) Some are thickened on the exterior (e.g. U-GL2287/2288, U-GL2671, and U-GL367), though the margins between these is fine, and thus their significance limited. A number of fragments from Kuwait, K-GL1391-1419, have been decorated using a mould-blown technique which has been used to create a subtle dimpled pattern (see §3.5.5.). The dimples seem to be relatively evenly distributed, but do not extend under the vessel base or up to the rim.

Most of the fragments belonging to this category and the *plain rims (thick)* are individually unique and highly fragmentary, specific parallels are not easy to come by. Generally speaking, however, most of the big glass assemblages in the Islamic world possess a similar range of plain vessels which are difficult to classify. For example, Meyer provides a range of similar vessel types from Nippur, which gives an idea of the range of possibilities as much as anything (Meyer 1996: 252, fig. 3.89-94). The same impression is seen at Seleucia (Negro Ponzi 1970-71: fig. 50.53-56) and Tell Baruda (Negro Ponzi 1987: fig. A), Fustat (Scanlon & Pinder-Wilson 2001: 21-24, fig. 1-2) and at Manda on the East African coast (Morrison 1984: 160, figs. 125 and 127) For the most part only tiny portions of the upper part of the rims survive. That said, the decorated vessel represented by K-GL1391-1419 offers a full vessel profile, revealing a small slightly convex-sided open vessel or bowl with a ‘push-up’ base in size *type 6*. As these vessels would have been thin-walled, they are likely to have been extremely delicate, difficult to transport, and of little practical use. As specific types occur in individual instances, it is tempting to consider them as items exchanged on an infrequent basis, presumably from diverse origins, and more likely to represent ‘stand-out’ items in any assemblage. The Kuwaiti examples are mostly in CL glass, with a small number of LGB examples. The Unguja Ukuu examples, however, come in a range of CL, OG, IB, LGB, TQ and BL colours - again indicating a diverse selection.

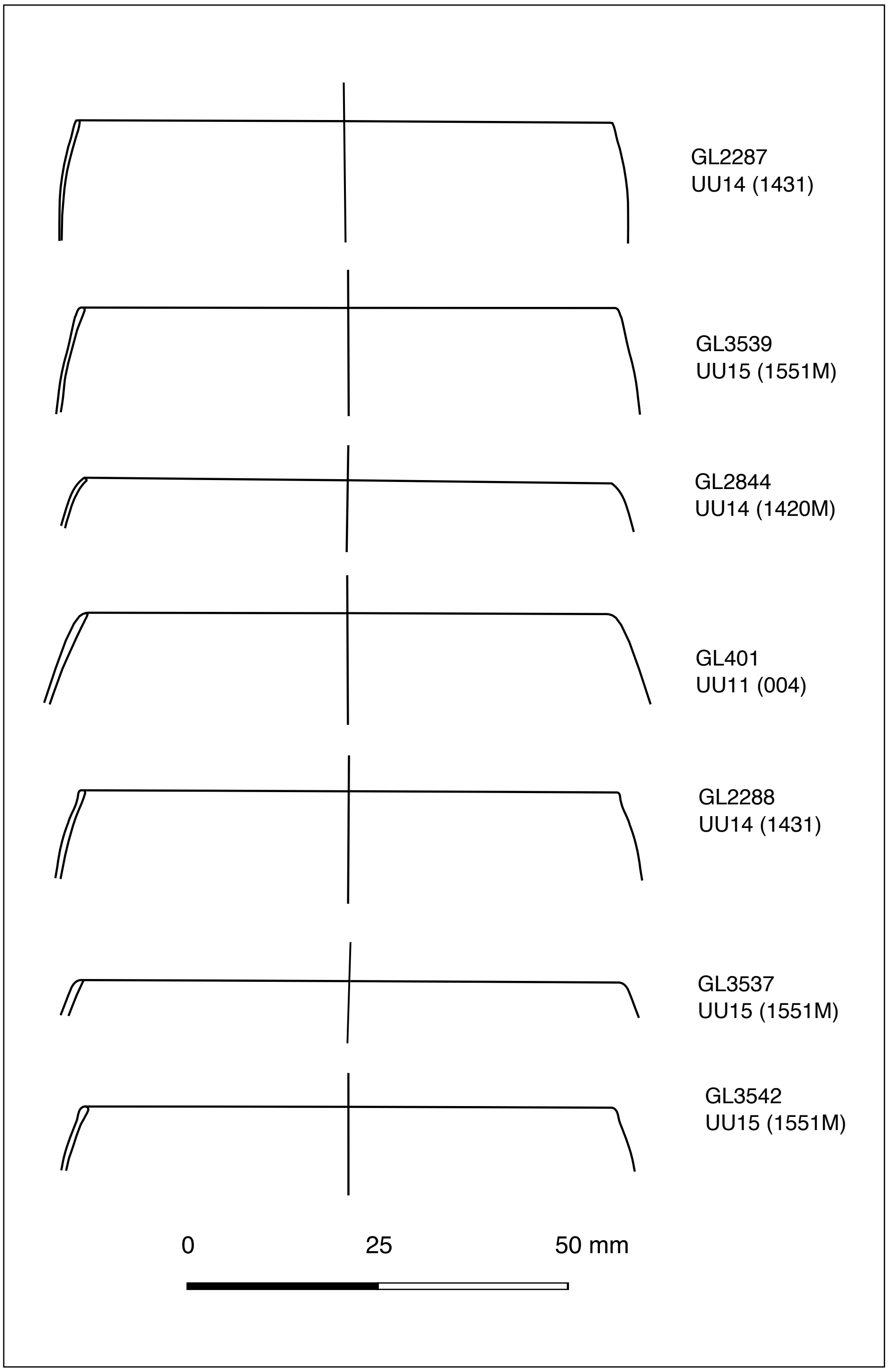


FIG. 3.55. PLAIN RIMS (FINE) FROM UNGUJA UKUU

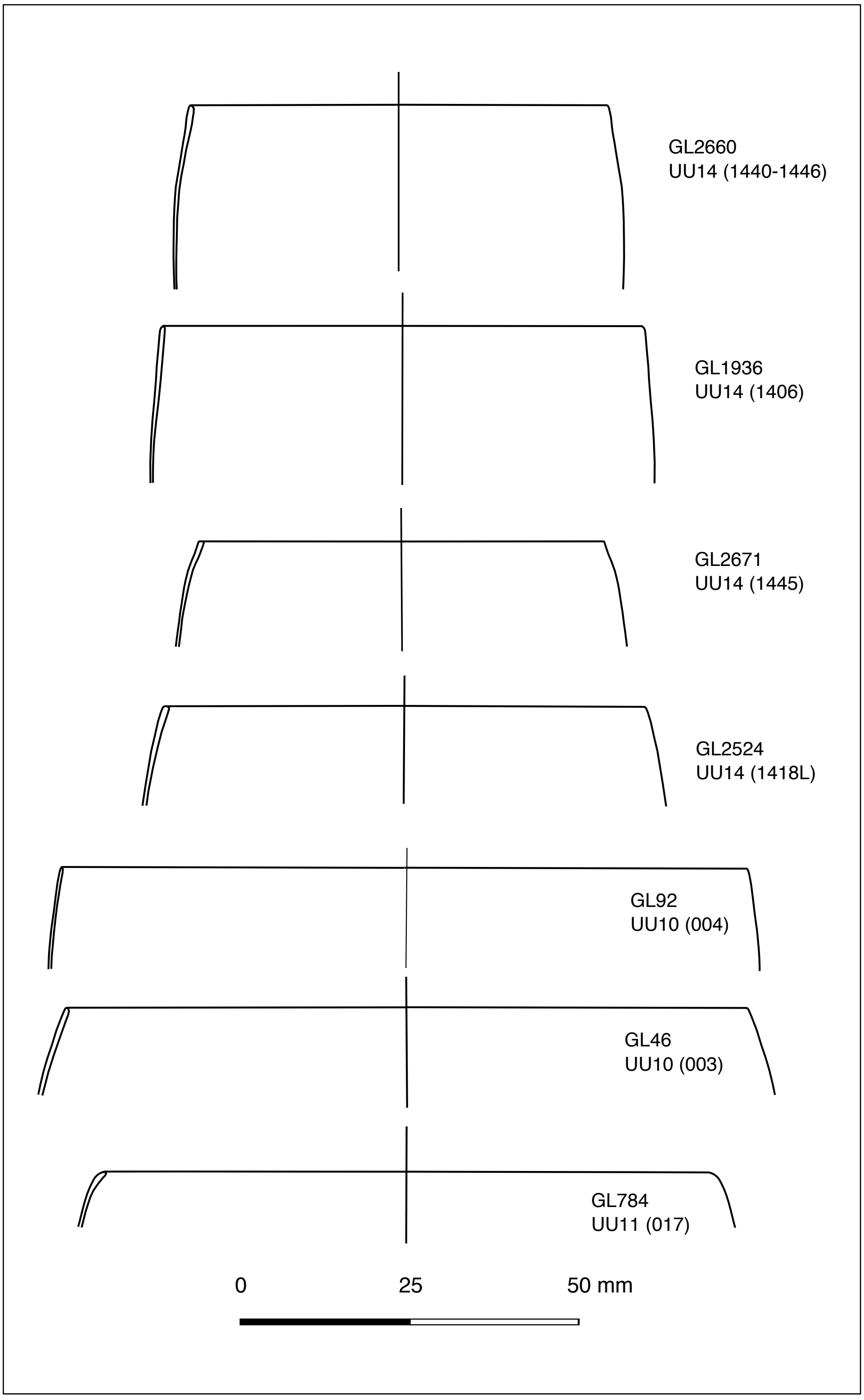


FIG. 3.56. PLAIN RIMS (FINE) FROM UNGUJA UKUU

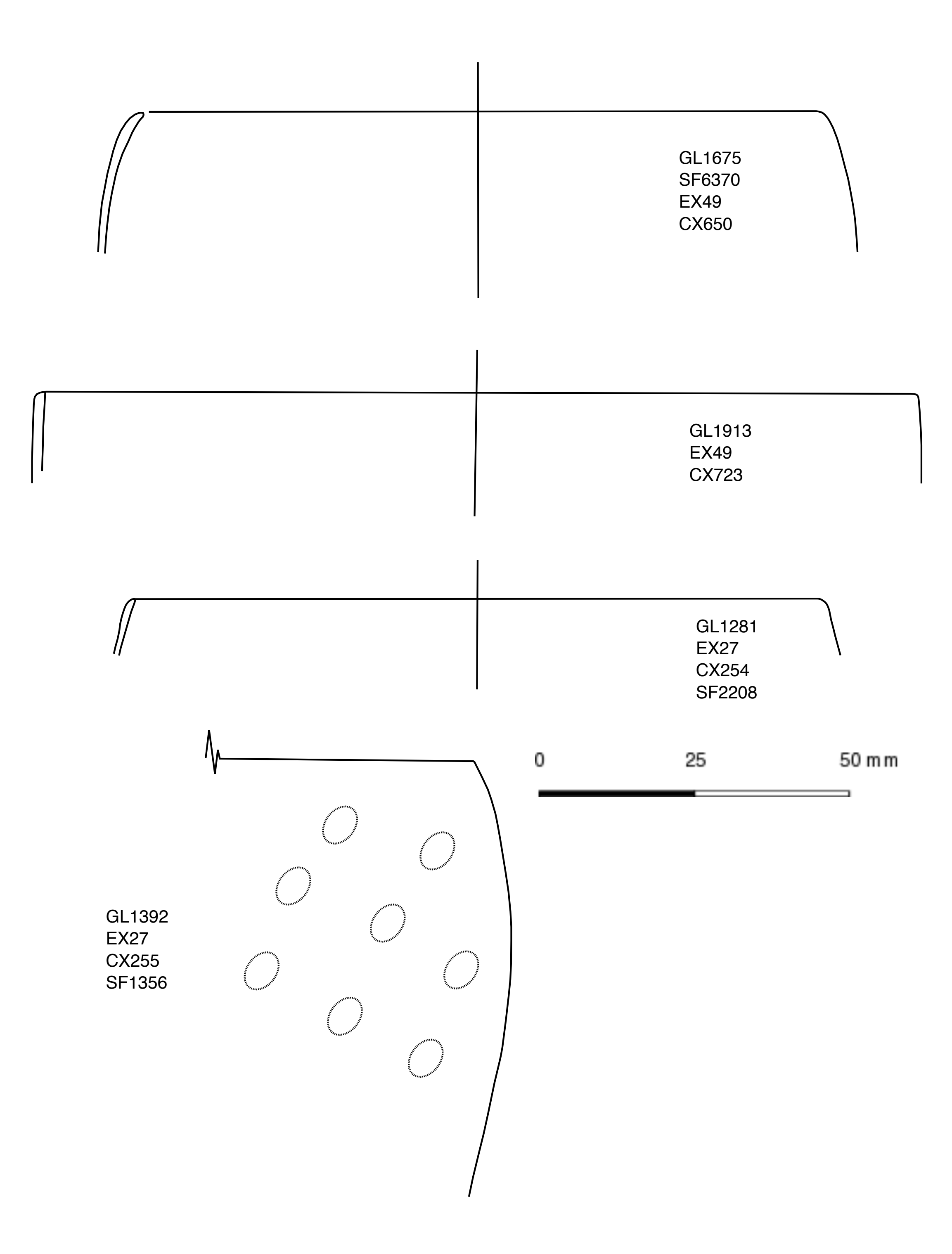


FIG. 3.57. PLAIN RIMS (FINE) FROM KUWAIT

3.2.9. Splayed rims

Splayed rims are a rare type of vessel. They are represented by just two fragments at Unguja Ukuu, and indeed is not present at Kuwait. The basic vessel profile consists of a open form with close to vertical-sided walls which, around 10-15 mm below the mouth, begin to 'splay' outwards at an angle of around 45 degrees (Fig. 3.58). Of the two fragments identified at Unguja Ukuu (U-GL3182 and U-GL3254), both are almost identical in terms of their characteristics and thus assumed to belong to the same vessel. In diameter this vessel measured 90 mm in diameter, and adhered to the basic definition given above of vertical side-walls which begin to evert 10 mm below the rim at an angle close to 45 degrees. The rim itself is simply rounded and un-thickened in relation to the vessel walls. Neither fragment preserves any evidence of any decoration, and both are IB in colour. The spayed bowls from the Sealinks excavations at Unguja Ukuu are near identical to a vessel presented by Juma from his Period Ib or IIa (Juma 2004: 125, fig. 7.1.4, no. 3). Elsewhere, interesting but ultimately unsatisfactory parallels can be found at Shanga (Horton 1996b: 315, fig. 237d), Nishapur (Kroger 1995: 51, nos. 28-30), and at Nippur (Meyer 1996: 250, fig. 2.40). This type seems to relate to a small but reasonable-sized beaker or bowl, well finished and unique in form, therefore possibly a prized piece. As such, it is well suited for conspicuous display as a rare tableware.

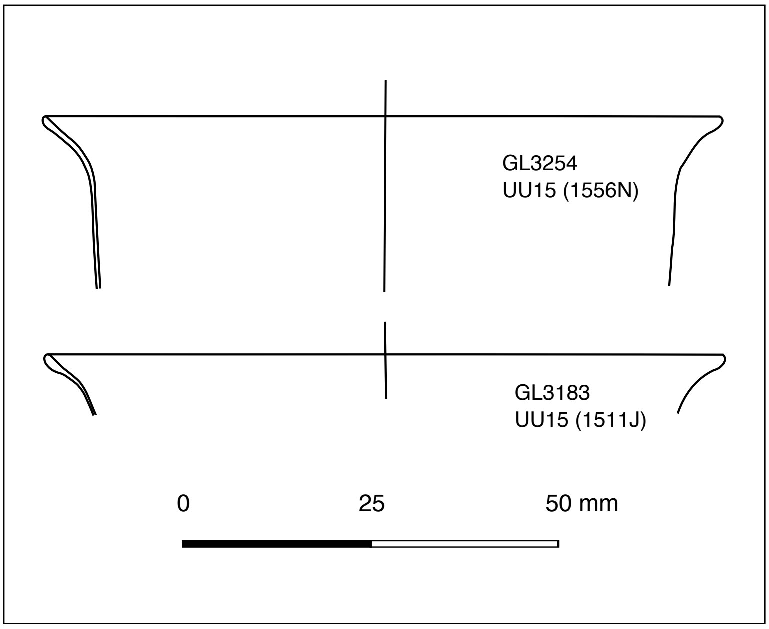


FIG. 3.58. SPLAYED RIMS FROM UNGUJA UKUU

3.2.10. Plates

The category of *plates* is another open ended or 'umbrella' category, and refers to fragments which belong to vessels which are flat or near flat in profile, much as a plate today. No *plates* were identified at Kuwait, however two distinct varieties of plates were identified at Unguja Ukuu: a ribbed plate, and several fragments from a dark blue plate or plates (Fig. 3.59). Rather than distinguish these by division into two types, instead they are both considered under a single category. Furthermore, it was decided to include the blue plate fragments in this section, even though they could be considered bases, to avoid division of the category.

The blue plate(s)

The blue plate is represented by two fragments from the centre of the base of what is probably the same vessel. U-GL2325 and U-GL2677 were produced in a high quality BL glass which is presumed to have been deliberately coloured with the addition of copper or cobalt. Although only the central portion of this vessel survives, it is likely to have extended to around 200 mm diameter. A fragment from the very central portion of the base reveals a thick but low push-up with a large pontil mark and has had a thin thread of glass applied in a circle around the point where the base would meet the surface on which it rested, thus functioning as a thin footing.

The ribbed plate

The ribbed plate is represented by a single fragment, U-GL2147, and consists of the edge a plate in TQ glass with a distinctive ribbed rim. Overall the vessel would have measured 170 mm in diameter. The ribbed effect appears to have been achieved by pincering and reheating the edge of the vessel.

In regard to the blue plate(s), similar examples are rare but well known. Often cobalt blue plates are found with *scratch-engraved* decoration and are thus assigned a 9th century date (see §3.5.2.) though undecorated examples are also known. Good examples are found in the crypt of the Famen Temple in Shaanxi Province, China, which was sealed in AD 874 (Jiang Jie 2010: 187). No close parallels for the plate with the ribbed rim were identified.

The *plates* appear to have been special vessels within the Unguja Ukuu assemblage. Not only are both rare, they also come in distinguished metals. While a functional role for *plates* as tablewares is likely, it is also worth considering whether such vessels were meant to be seen - conveying as they do a sense of exclusivity and wealth. As well as set on their base, it is also easy to imagine these vessels as having been mounted on a wall or otherwise. Such a use for imported material culture is known in a later Swahili context in regard to Chinese glazed bowls, which were set vertically onto pillars associated with burial monuments.

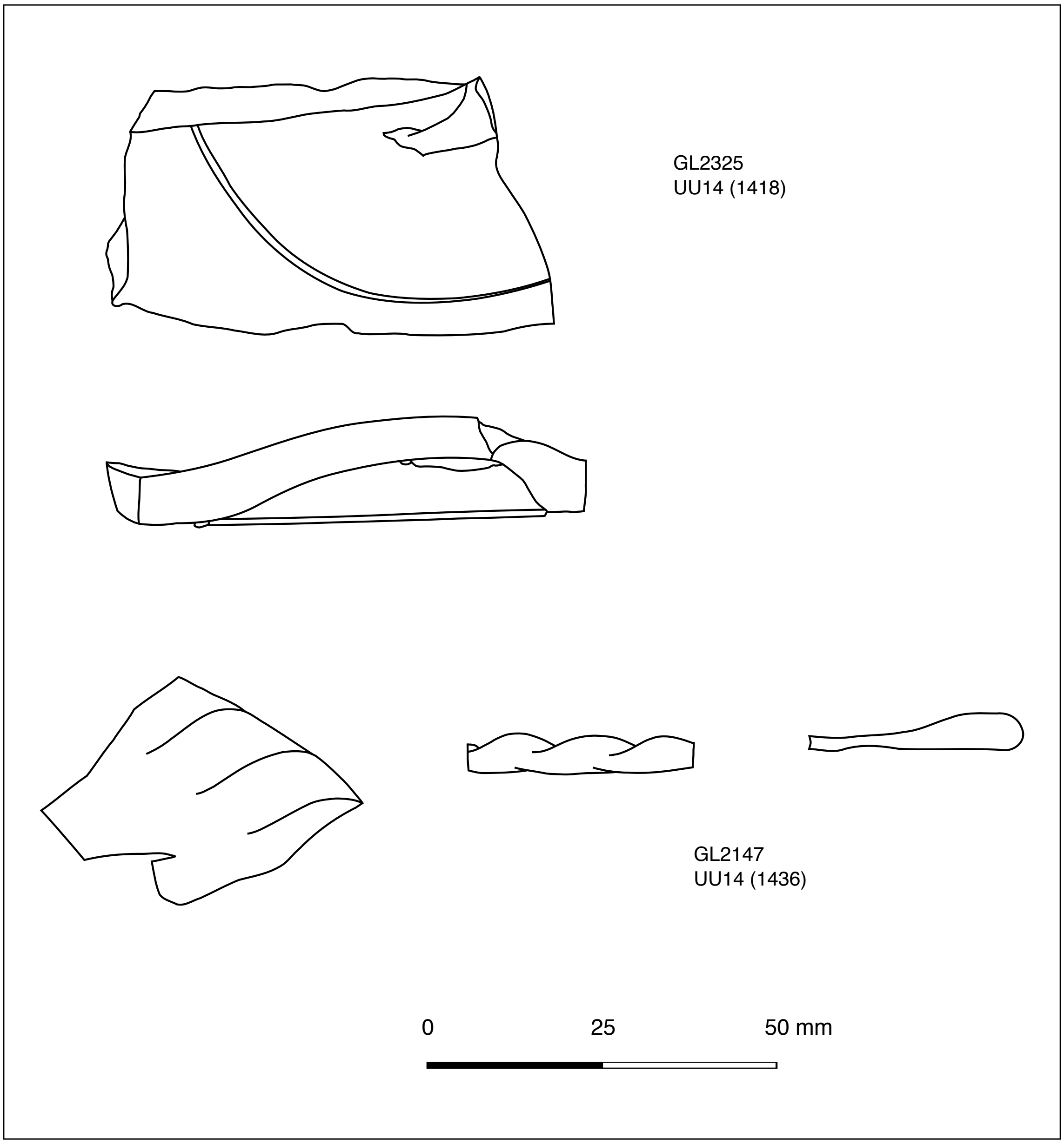


FIG. 3.59. PLATES FROM UNGUJA UKUU

3.3. Base Types

3.3.1. Push-up bases

The *push-up base* is the most common base form present in all glassware traditions since the invention of the free-blowing technique. The idea and technique behind the push-up base is a simple one: as the unfinished vessel is transferred to the pontil, the centre of the base is raised or 'pushed-up'. When the vessel is subsequently set upright, only a circular ring will make contact with the surface. This technique has the advantage of efficiently providing the vessel with a clean and stable footing, ensuring that uneven and unsightly pontil marks remain hidden from view and out of contact with the surface. The 209 'push-up' base fragments from Kuwait compare with 171 from Unguja Ukuu (Fig. 3.60, 3.61, 3.62, 3.63, 3.64, 3.65, 3.66, 3.67).

There is a huge amount of variability within the category *push-up bases*, particularly in terms of size (that is, diameter and height). To accommodate this diversity, while recognising that the range of dimensions is a spectrum rather than forming distinct groups, the push-up bases have been allocated to one of seven sized-based sub-categories. In addition, many push-up bases survive as fragments from the centre or edge of a vessel, making measurement of dimensions near on impossible. These fragments have been consigned to the sub-category 'edge of push-up' (Fig. 3.60). Within the Kuwaiti assemblage, as expected, there is considerable variation in base diameter (Fig. 3.61). Excluding the *edge of push-up* sub-category, within the Kuwait assemblages most of the bases fall into *type 2* and *type 3*, corresponding to a size range of 15 to 34 mm. Very small (*type 1*) and very large (*type L*) bases are not common, with fairly consistent numbers falling into *types 4* to *6*, that is, 35-64 mm in diameter. The Unguja Ukuu push-up bases mostly fall into *type 3* and *type 4,* with half the quantity in *types 1, 2* and *5. Type 6* and *type L* have just a few fragments each (Fig. 3.62).

Two main types of pontil mark can be seen in association with the *push-up* bases: hollow and solid. Solid pontil marks are the most common, reflecting the use of a solid iron pontil normally tipped with a small amount of glass to allow it to be securely fixed to the unfinished vessel base. Upon removal of the pontil an irregular mark remains, generally consisting of a rough circle corresponding to the size of the pontil along with jagged protrusions of glass left behind from the glass tip. Sometimes part of the main vessel base flakes off as the pontil is removed, leaving a negative scar. Hollow pontils can be recognised by their distinctive marks, normally consisting of a raised hollow cylinder of glass, the centre of which is relatively untouched. Hollow pontil marks in fact indicate the use of the blowpipe as a pontil. Presumably the unfinished vessel is rested on the marver while the blowpipe is cracked off from the open end. The piece of glass that normally remains affixed to the mouth of the blowpipe after this stage (the moyle/ moil) is likely to have been reheated then used as a tip to facilitate fixation of the blowpipe to the base as makeshift pontil. Alternatively, a second blowpipe could be used in the absence of an available pontil.

Solid pontils appear to dominate the push-up bases in the Kuwait assemblage by a ratio of more than 3:1. *Type 1 push-up bases* can be associated with both solid and hollow pontil marks, as demonstrated by K-GL1445 and K-GL2113, and indeed the pontil marks are of a considerable size in comparison to base diameter. That said, K-GL1033 shows that pontils of much smaller diameter (e.g. D. 1.2 mm), whether improvised or not, were occasionally employed. Hollow pontils appear slightly more common in association with *type 2* (15 to 24 mm diameter), however the numbers are so small as to make statistical analysis redundant. Solid pontil diameters increase in accordance with base diameters up to a point, peaking at an average of around 17.35 mm in push-up 6. Although the numbers are too small to be certain, hollow pontils appear slightly narrower on average. It should be noted that in many cases it was impossible to measure the pontil diameter with precision beyond 2-3 mm, thus many of the measurements were rounded to the nearest 5 mm interval. If the same is done for all the solid pontil marks it is clear that there is a fairly even distribution of sizes around 10 to 20 mm in diameter, though the 10 mm group is the most common. Regarding the hollow pontils, the distribution is again focused on the 10 to 20 mm size range, with the 10 mm group again the most common. The numbers here are however small, and it is not clear whether the patterns given are overly significant. It is also important to remember that these size groups are arbitrary constructions. At Unguja Ukuu, seven fragments have hollow pontils, though five of these belong to the same vessel. The remaining 59 (where measurable) have solid pontil marks, showing that this technique clearly dominates, but to an even greater extent at Unguja Ukuu than in Kuwait. The hollow pontils are found in *type 1* and *type 5*. In terms of size, the measurable example from *type 1* is 10.1 mm in diameter, while the *type 5* example measures 16.2 mm. The solid pontil diameters range from a minimum of 3 mm to a maximum of 20 mm. Looking at the average solid pontil size for each type, it seems that size is increasing more or less in correlation with base diameter, though it should be said that some of these measurements are based on very few fragments. The peak of 15 mm in push-up 6 is several millimetres smaller than with the Kuwaiti glass.

	Kuwait	Unguja Ukuu
Push-up 1 (>14 mm)	6	7
Push-up 2 (15-24 mm)	20	7
Push-up 3 (25-34 mm)	32	16
Push-up 4 (35-44 mm)	12	16
Push-up 5 (45-54 mm)	11	7
Push-up 6 (55-64 mm)	10	3
Push-up L (65 + mm)	3	7
Edge of Push-up	115	108

FIG. 3.60. QUANTITY OF *PUSH-UP BASES* BY TYPE

KUWAIT	Hollow Pontils	Hollow Diameter	Solid Pontils	Solid Diameter
Push-up 1	1	6.5 mm	5	4.64 mm
Push-up 2	9	9.88 mm	6	7.5 mm
Push-up 3	3	12 mm	22	11.4 mm
Push-up 4	1	15 mm	6	16.8 mm
Push-up 5	1	19 mm	7	15.4 mm
Push-up 6	3	16.4 mm	4	17.35 mm
Push-up L	2	19.5 mm	1	-
Edge of Push-up	2	11.25 mm	24	17.33 mm

FIG. 3.61. SUMMARY OF *PUSH-UP BASE* PONTILS FROM KUWAIT

UNGUJA UKUU	Hollow Pontils	Hollow Diameter	Solid Pontils	Solid Diameter
Push-up 1	2	10.1 mm	3	9.1 mm
Push-up 2	0	-	4	5.33 mm
Push-up 3	0	-	14	13.3 mm
Push-up 4	0	-	11	12.65 mm
Push-up 5	1	16.2	3	13.25 mm
Push-up 6	0	-	2	15 mm
Push-up L	0	-	1	13 mm
Edge of Push-up	0	-	21	15.6 mm

FIG. 3.62 SUMMARY OF *PUSH-UP BASE* PONTILS FROM UNGUJA UKUU

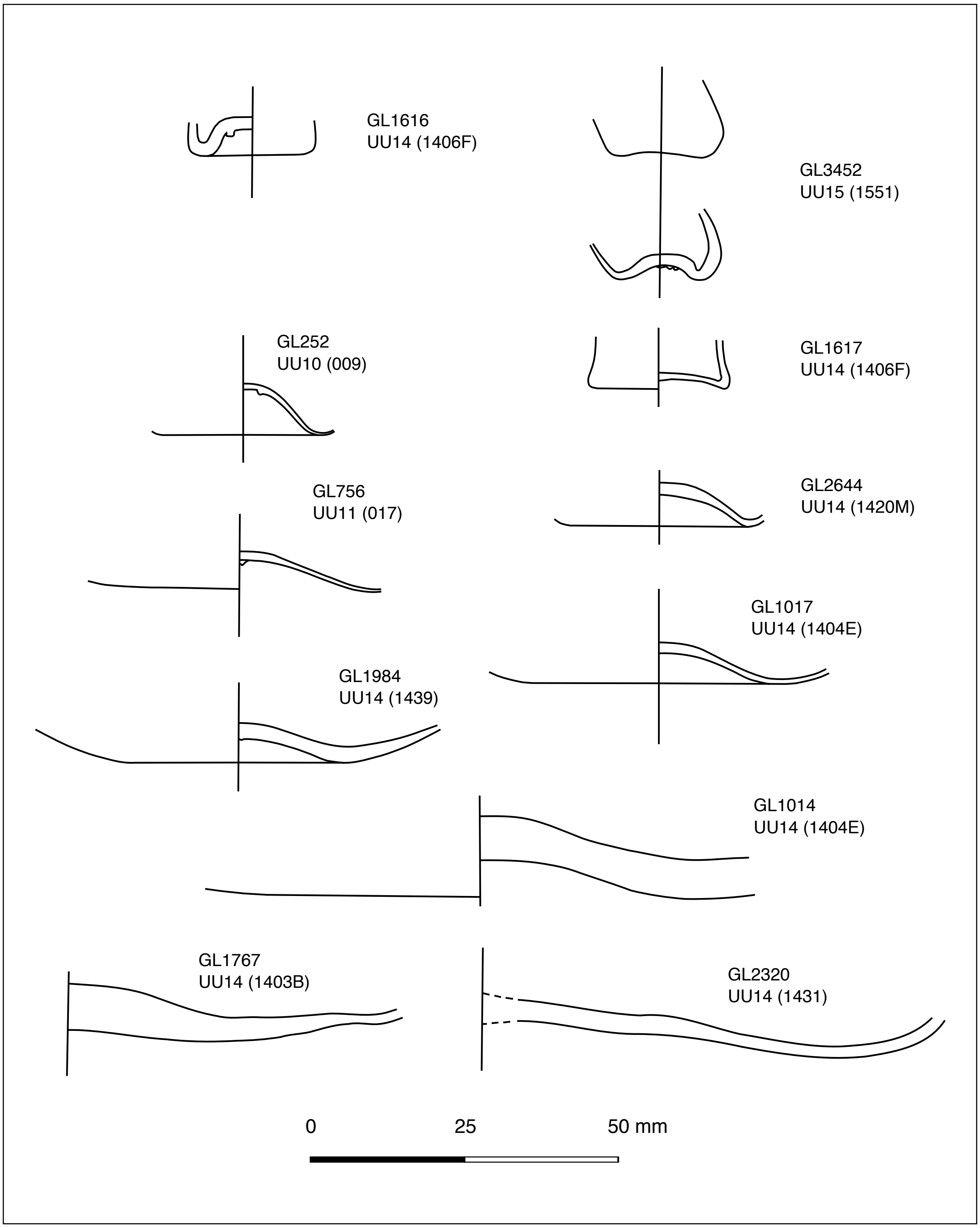


FIG. 3.63. PUSH-UP BASES FROM UNGUJA UKUU

The vast majority of the push-up bases retain a domed appearance when the profile is considered. Depending on the angle at which the pontil was applied to the vessel, this dome may be slightly uneven, favouring one side or the other. Occasionally, the pushed-up base has a pointed appearance in the interior. This can be seen in Kuwait with fragments K-GL1025, K-GL1310 and K-GL1320 (also possibly K-GL1348 and K-GL35). This pointed appearance may relate to the use of a particularly narrow solid pontil or even have been effected deliberately after the pontil had been removed. U-GL2320 is different again, representing a typical domed base that has been subsequently flattened on the interior. Again the reason for this is uncertain, but this base must have belonged to an open vessel to allow the glassworker access to the interior of the base.

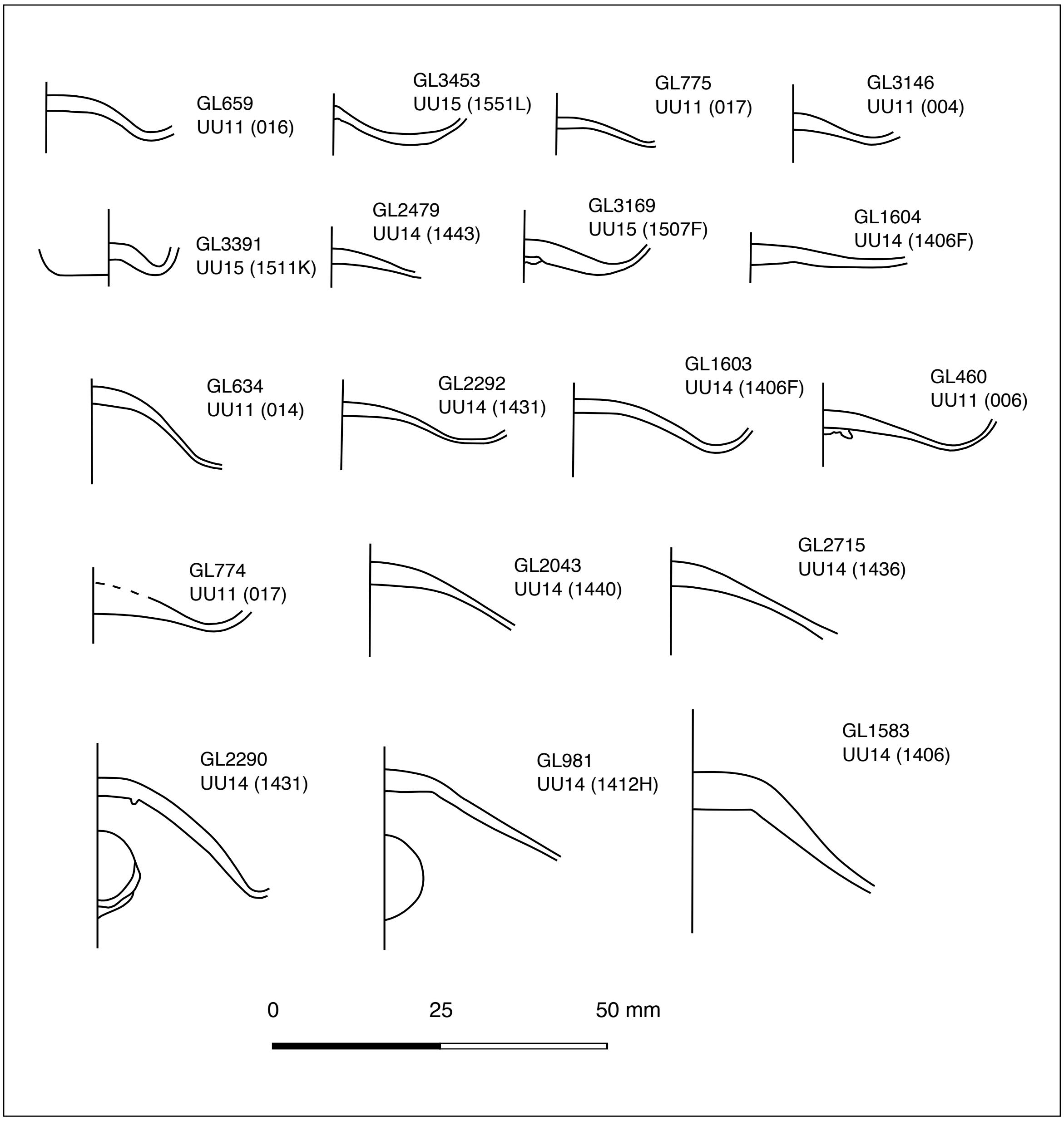


FIG. 3.64. PUSH-UP BASES FROM UNGUJA UKUU

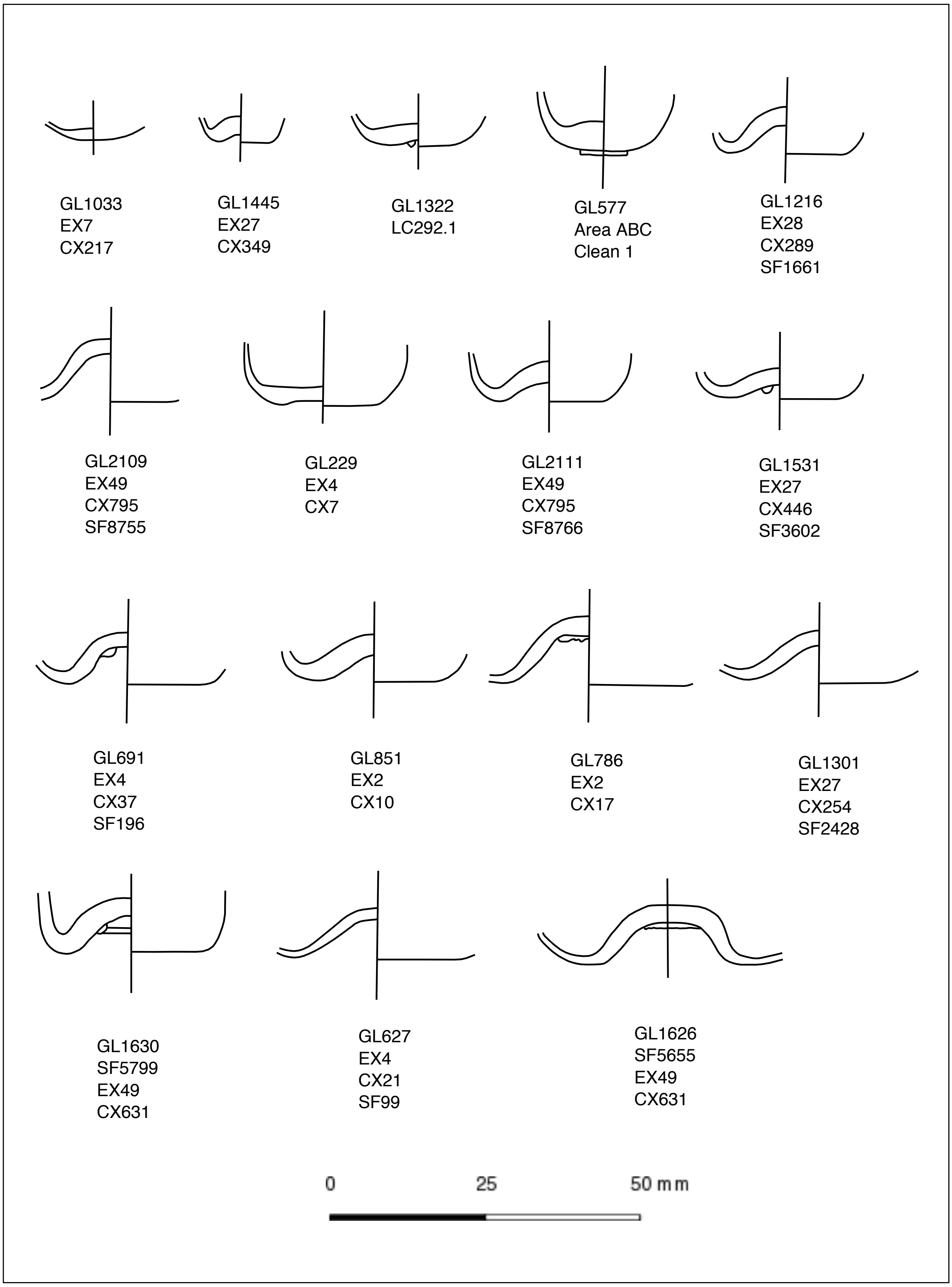


FIG. 3.65. PUSH-UP BASES FROM KUWAIT

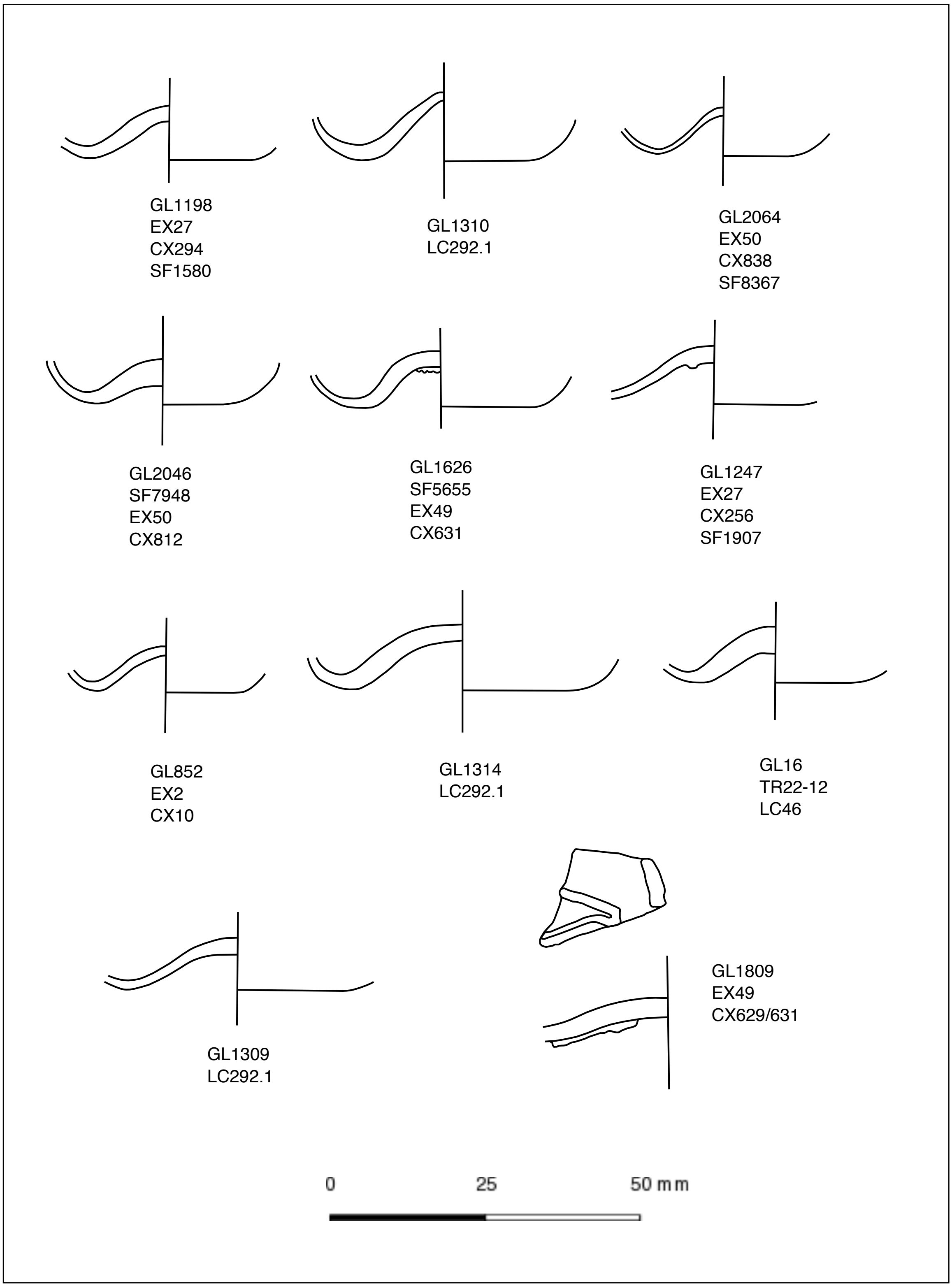


FIG. 3.66. PUSH-UP BASES FROM KUWAIT

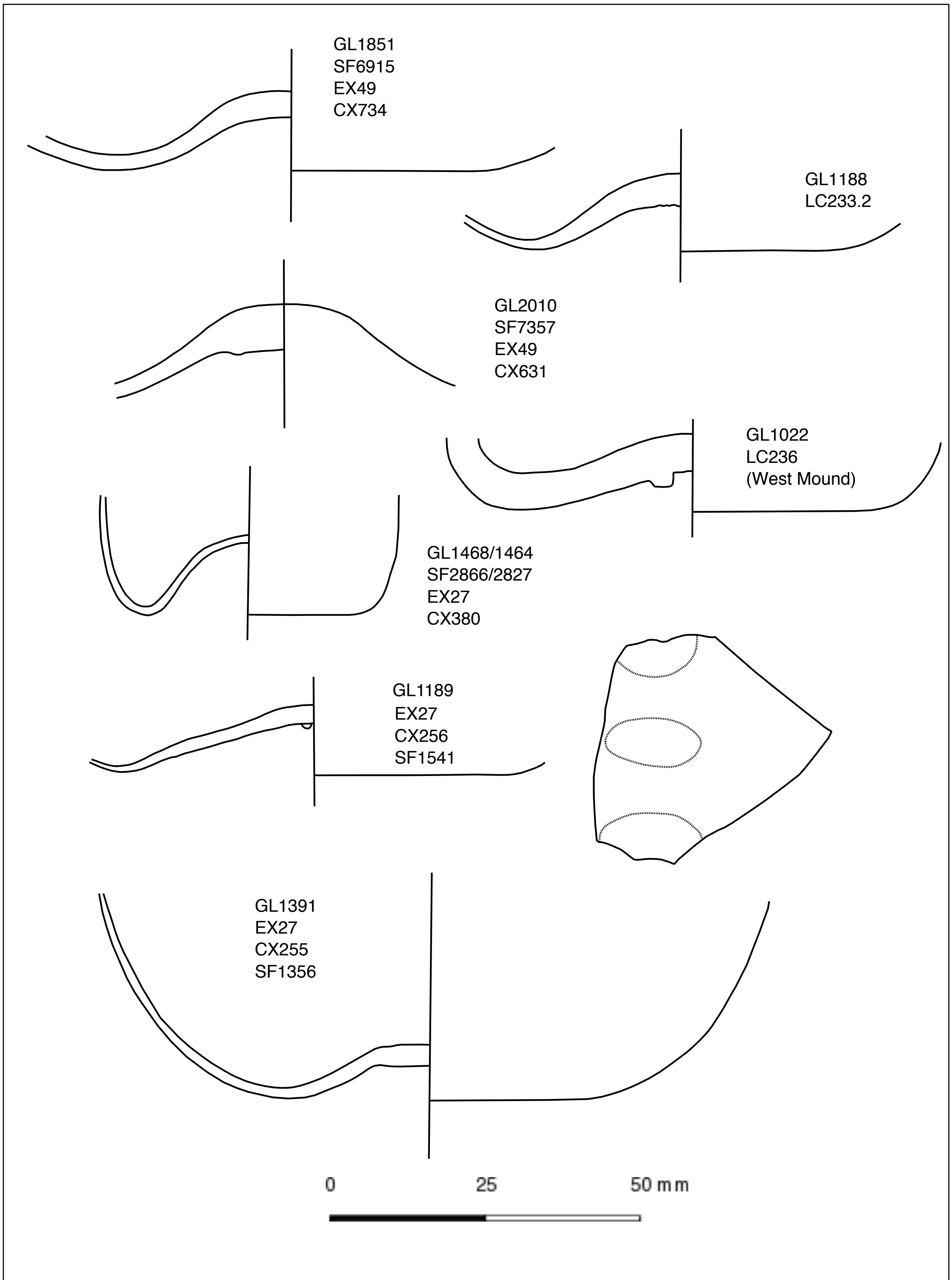


FIG. 3.67. PUSH-UP BASES FROM KUWAIT

Only three of the push-up base fragments from Kuwait can be associated with any decoration. This is not in itself significant as even the bases of highly decorated vessels are often devoid of any decoration. This is exactly the case with K-GL1391 and K-GL1393. Both represent base fragments of the same vessel, an open form with a *plain rim (fine)* (represented by GL numbers K-GL1391 to K-GL1419), the side-walls of which exhibit a mould-blown dimpled effect (see §3.5.5). However, neither of these base fragments possess any dimples, having remained untouched by the mould. K-GL1189 is different in that it is itself decorated. The pushed-up part of the base has been thickened at intervals, creating a fluted effect running outwards from the centre. A number of the fragments from Unguja Ukuu exhibit traces of decoration or other embellishment. U-GL1984 appears to have been stamped in the area where the pontil would have been attached, with six indents in a circular pattern around the central part of the underside of the base. It is uncertain whether this in fact represents an alternative to a pontil, any trace of which is absent. U-GL3065 was also stamped in the central underside of the base.

The push-up bases are found in five different metal groups at Unguja Ukuu, and seven groups in Kuwait, excluding heavily weathered glass. At Unguja Ukuu, IB, CL, LGB and OG glass are the most common groups, with a smaller quantity of BL glass. The Kuwaiti bases are dominated by LGB glass, with smaller numbers of OG, CL, EG, BL, TQ and IB glass. There is no obvious relation between colour and base size.

While the dimensional figures give some idea of the range of vessel sizes within the assemblage, it is difficult to extract much more typological information from these incomplete fragments alone owing to the fact that push-up bases can be found in association with almost any vessel form. Particularly interesting are the few smallest fragments (*type 1*). The size of these bases indicates vessels of closed forms with maximum diameters of no more than 15 to 20 mm at most. Such fragments are often considered in the wider literature under the heading ‘phials’ and presumed to have been used as small containers for precious and valuable commodities, whether liquids or powders. There are few rims in the Kuwait or Unguja Ukuu assemblages which are obviously associated with vessels this small, though as only a small number of *type 1* base fragments survive in each assemblage this is not surprising, especially given the fact that rims are normally much more fragile and prone to breakage. Again it seems sensible to associate *type 2* and *type 3* with closed vessel forms, though as one goes up the size scale this assertion becomes ever less secure and it would be dangerous to make such statements regarding *types 4, 5, 6* and *L*. While it is expected that most of the larger bases represent open vessels, there is no clear relationship between open forms and larger base diameters. For example, one of the largest bases in the assemblage, K-GL1085 (D. 75 mm), could well belong to a closed vessel, specifically a globular bottle of the type associated with *folded and flattened rims*.

Perhaps owing to their near ubiquitous presence and broadly undiagnostic nature, most glass reports do not publish many base fragments unless they are part of a complete vessel profile. An impression of some of the variability within the *push-up bases*, both in size and degrees of pointedness, can be garnered from the examples from Nippur, which Meyer dates to the late 7th-8th century AD for the main (Meyer 1996: 254, fig. 143-153), as well as Qal'at Seman (Dussart 2003: 176, fig. 5.8-9), and Seleucia (Negro Ponzi 1970-71: fig. 52-53).

FIG. 3.68. APPLIED PAD BASES FROM KUWAIT

3.3.2. Applied pad bases

The category of *applied pad bases* refers to a technique whereby a thin, normally circular disc of glass is applied to the base of the main vessel (Fig. 3.68, 3.69). This simple technique must have been carried out to provide a stable, flat base for the vessel allowing it to stand upright. A wide range of forms and metals can be associated with *applied pad bases.* As such, it is better to consider this category as defined by the presence of a shared technique, rather than reflecting stylistic similarities, and perhaps best to consider the relevant fragments individually. Two fragments of this type were identified in Kuwait, compared to just one from Unguja Ukuu.

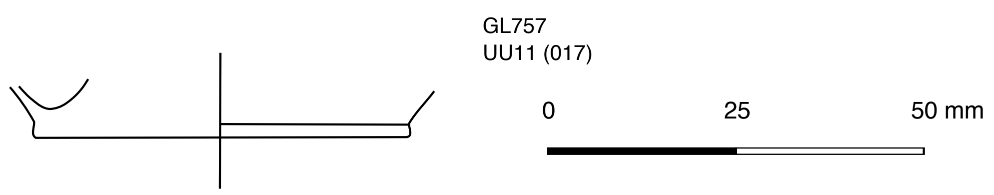


FIG. 3.69. APPLIED PAD BASE FROM UNGUJA UKUU

Among the Kuwaiti fragments, K-GL948 consists of a thin (T. 3 mm), flat and probably circular piece of OG glass which has been applied to a delicate vessel produced in the same metal. Unfortunately this piece is highly fragmentary and has been rounded by exposure to the elements making estimation of base diameter and vessel form impossible. K-GL1252 exhibits a larger pad (D. 18 mm; T. 3.9 mm). The pad is again flat and roughly circular, though it has been chipped around the edges, and has been slightly thickened in the centre. The bottom of the pad exhibits a twisted pattern and strain lines from the working process. This fragment appears to have been deliberately coloured to some degree, exhibiting a TQ colour with some darker streaks. The Unguja Ukuu fragment, U-GL757, consists of a similar thin pad (D. 50 mm; T. 3 mm), applied to a main vessel in OG glass, which has been thickened in the centre.

3.3.3. Applied ring bases

The *applied ring base* type refers to a technique whereby a section of glass is added to the bottom of an unfinished vessel with the intention of creating a circular ring of contact between the vessel and the surface (Fig. 3.70, 3.71). Applied ring bases can be produced in a number of ways. One approach involves the application of a thick thread of glass which is trailed in a circular pattern directly onto the bottom of the vessel and then re-heated to fuse the join. In other cases, a pre-formed ring may be applied to the vessel, or indeed a pad which has been manipulated to produce a protruding ring around its circumference. The two *applied ring bases* from Kuwait compare with just one from Unguja Ukuu.

Each of the different working methods is present in the Kuwaiti fragments. In the case of K-GL270, a seemingly pre-formed ring (D. 70 mm, T. 4.4 mm, L. 6.6. mm) has been applied to the bottom of an OG vessel. A large air bubble has been trapped where the two pieces have been joined. The vessel was subsequently re-heated to fuse the join between ring and base, leaving it subsequently invisible. In contrast, a ring-base effect has been produced on K-GL576 via the application of a circular pad, 40 mm in diameter, which has been subsequently pushed-up in the centre to leave only the circumference in contact with the surface. This *applied ring base* was produced in CL glass. U-GL500 exhibits the same method as K-GL270, whereby a preformed ring has been applied to the bottom of an IB glass vessel. However, in this case the ring has been subsequently folded to complete the shape. Three very good examples of *applied ring bases* can be found in supposedly 8th century AD contexts at Seleucia (Negro Ponzi 1970-71: Fig. 54. 103, 104, 106), with an example at Samara depicted alongside a *folded* example (Lamm 1928: 18, Fig. 8).

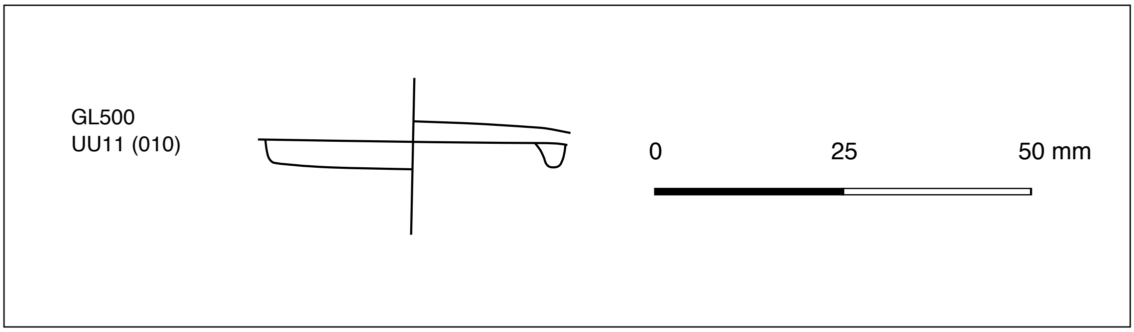


FIG. 3.70. APPLIED RING-BASE FROM UNGUJA UKUU

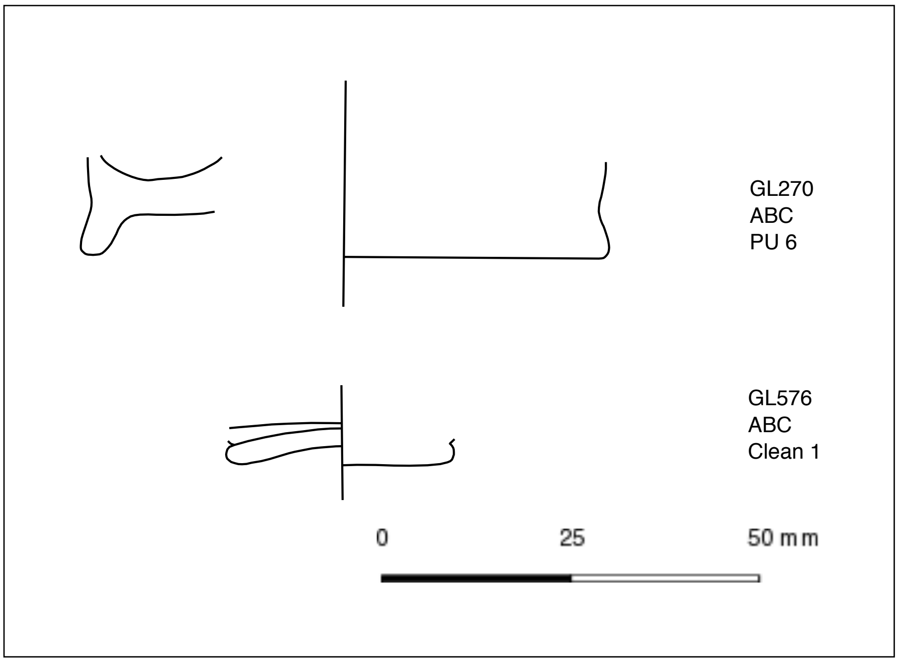


FIG. 3.71. APPLIED RING-BASES FROM KUWAIT

3.3.4. Folded ring bases

Folded ring bases can be achieved by folding the lower portion of a vessel to leave a narrow ring of glass in contact with the surface (Fig. 3.72, 3.73). Often the folds are not tight and leave a hollow barrel within the folded glass. Double folds are not unknown. There is of course an immense range of variety in the outcomes of this process, and many different folding techniques. Just one *folded ring base* was found in Kuwait, compared to seven at Unguja Ukuu.

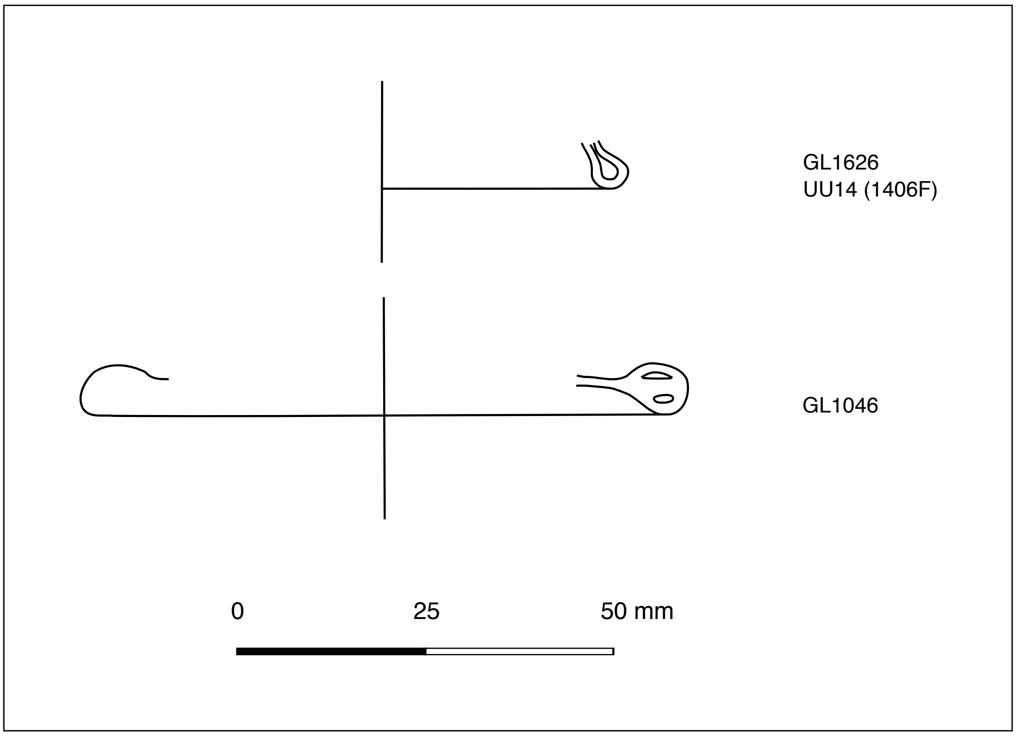


FIG. 3.72. SINGLE AND DOUBLE VARIETIES OF FOLDED RING-BASES FROM UNGUJA UKUU

The Kuwaiti fragment, K-GL3, measures circa 50 mm in diameter. The fold in this case is elongated [L. 15+ mm], and forms not just the base but the lower portion of the vessel as a whole. The walls slope diagonally inwards at an angle of around 45 degrees. The fold is not tight, leaving a hollow barrel. The glass metal is an LGB colour. Among the Unguja Ukuu fragments, U-GL280, U-GL1626 and U-GL1998 represent single folds, and U-GL1044, U-GL1046 and U-GL1047 double folds. Where it is possible to estimate, base diameters measure 50 mm (U-GL280), 60 mm (U-GL1626) and 80 mm (U-GL1044) respectively. The folds have not been effected tightly, and thus leave characteristic hollow barrels in each case. IB glass is most common, with four examples, with smaller numbers of CL and OG glass.

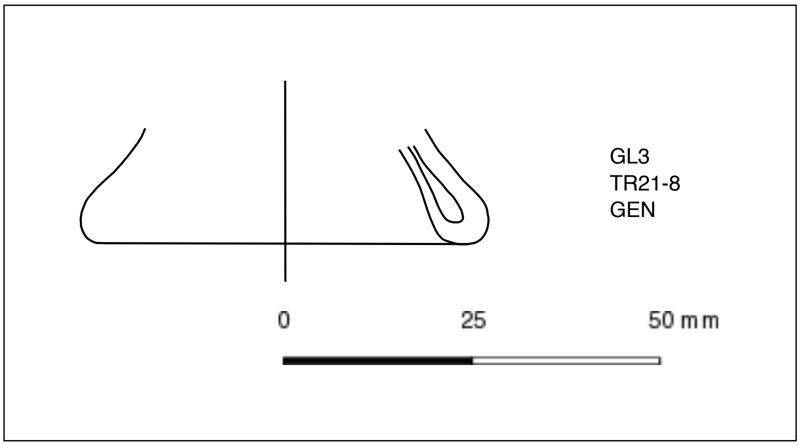


FIG. 3.73. FOLDED-RING BASE FROM KUWAIT

Folded ring bases are not uncommon in the repertoire of Early Islamic vessel glass, and indeed other periods. For example a range of open vessels and goblets with *folded ring bases* can be found in the Syro-Palestinian region at Tirat HaCarmel, though these are dated by the author to the Late Roman and Byzantine periods (Pollak 1996: fig. 3: 20-24, fig. 4: 39), as also at Bat Galim (Pollak 2008: 54-56, fig. 1). K-GL3 may possibly belong to a hollow stemmed goblet, but could also have formed the ring base of a large lamp. In terms of function, stemmed goblets are normally considered under the category of drinking vessels, however it has been pointed out that such vessels could also have been used as lamps (Pollak 1996). A range of types of *folded ring base* are known from Nippur (Meyer 1996: 254, fig. 4.154, 156, 157), Seleucia (Negro Ponzi 1970-71: fig. 54.105), Samara (Lamm 1928: 18, fig. 8), and Manda (Morrison 1984: 174, fig. 142a-b).

3.3.5. Solid ring bases

Solid ring bases differ from the above in that they are an integral part of the vessel lower walls, having been drawn or stretched rather than folded or applied (Fig. 3.74). This type of base is not present at Unguja Ukuu, with just one example from Kuwait. K-GL1109, measures 70 mm in diameter, and possess an EG metal. The side-walls of this base taper inwards at an angle of around 70 degrees. The exterior surface of the fragment is decorated with a light ridged effect on its exterior surface presumably achieved by partial mould blowing, though this is unclear. The manner in which the side-walls of this base taper inwards suggests that, rather than a narrow vessel such as a stemmed goblet, this fragment originally belonged to a large open vessel much in excess of 70 mm diameter. Parallels for solid ring bases are not easy to find, however an example from Nippur is very similar to the Kuwaiti fragment (Meyer 1996: 254, fig. 4.155).

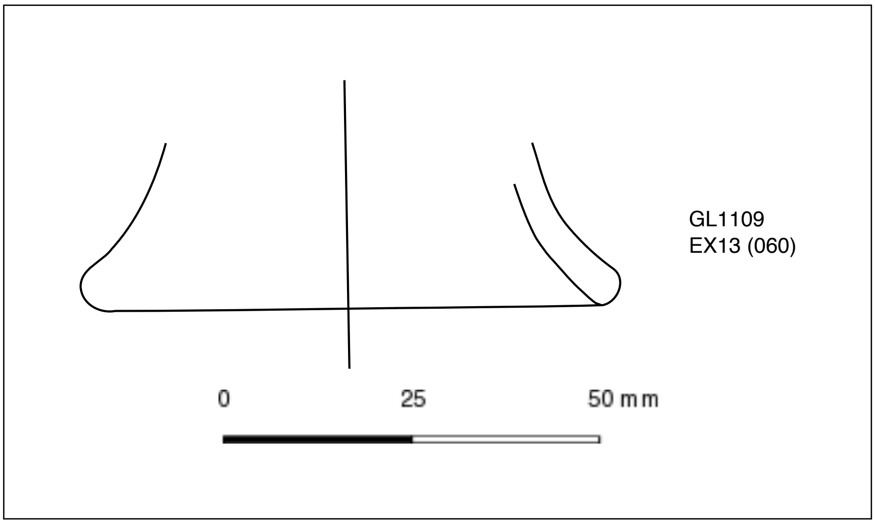


FIG. 3.74. SOLID RING BASE FROM KUWAIT

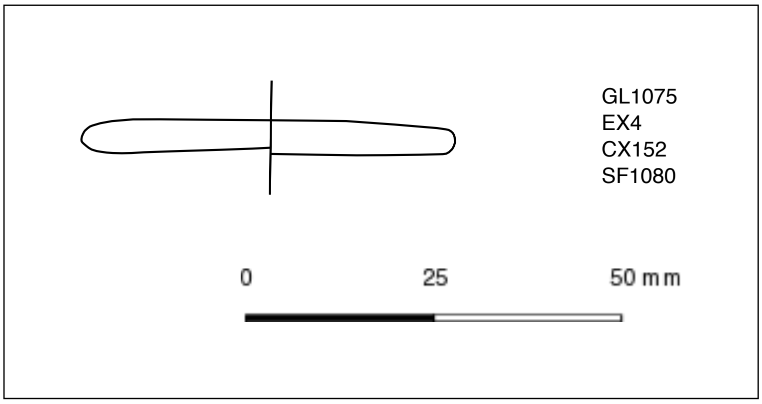


FIG. 3.75. FLAT DISC BASE FROM KUWAIT

3.3.6. Flat disc bases

The *flat disc base* is rather enigmatic and hard to define owing to the poor state of completeness upon which it is based. The type includes a fragment which consists of little more than a thick circular disc (Fig. 3.75), which was clearly intended as part of a base and not an *appliqué button* (see §3.5.4.). It is not present at Unguja Ukuu, with just one fragment from Kuwait. K-GL1075, measures 50 mm diameter, and appears to be progressively thickened towards the centre and slightly pushed-up to allow the vessel to stand evenly. As only the edge of this base survives, it is difficult to make further comments as to the central base profile, and thus to understand its relation to the rest of the vessel. It is possible that it was stemmed or even applied at a narrow point, and that this portion is missing. It is tempting to consider this fragment as a base for a stemmed vessel such as a goblet, but any such identification must remain tentative at best. A potential *flat disc base* created by folding may be represented at Seleucia (Negro Ponzi 1970-71: fig. 54.109).

3.3.7. Flat angular bases

Flat angular bases are similarly difficult to understand, including bases which have flat bottoms and marked angular transitions to the side-walls (Fig. 3.76, 3.77). Presumably this effect was achieved by mould blowing, or less likely by a process of flattening. A single fragment was found at Unguja Ukuu, with just two from Kuwait. Regarding the Kuwaiti examples, K-GL1321 represents little more than a small edge fragment from a TQ vessel base, for which it is impossible to measure the diameter. K-GL1566, with a diameter of 100 mm, appears to have been associated with a reasonably large open vessel with vertical walls and has likely been mould blown in its entirety. The combination of this form, its smooth CL metal and the fact that this fragment was a surface find (LC292.2) make it possible that this fragment is relatively modern, however it is difficult to be certain. An insufficient amount of the base from Unguja Ukuu, U-GL327, is preserved to allow an estimation of base diameter. Otherwise, U-GL327 possesses the typical sharp profile transition from base to side-walls, and again seems to have been mould-blown on this basis as well as the texture of the surface. The glass is an OG colour.

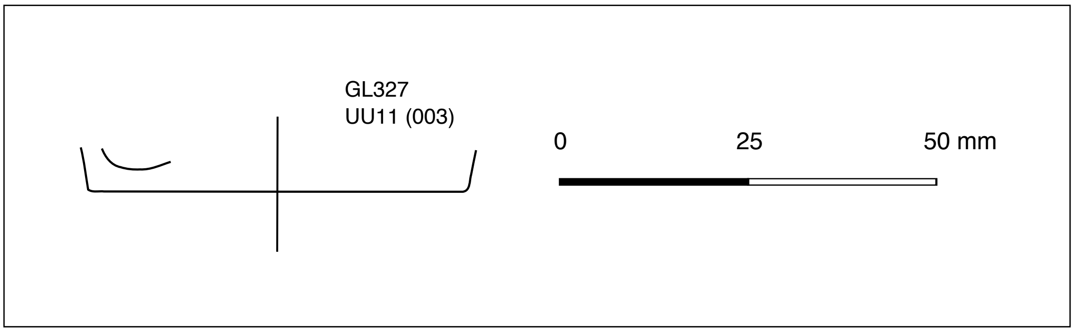


FIG. 3.76. FLAT ANGULAR BASE FROM UNGUJA UKUU

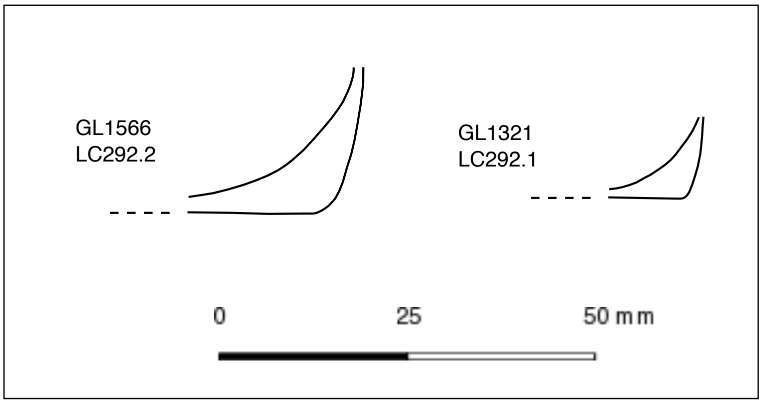


FIG. 3.77. FLAT ANGULAR BASES FROM KUWAIT

3.3.8. Flat to rounded bases

The adherents to this type of base are thin and often delicate. In profile they tend to be flat or even slightly rounded, by virtue of having not been 'pushed-up'. Often this is at the expense of a stable footing, which does not seem to have been a concern of the glassworker. Indeed, many of these base fragments possess prominent solid pontil marks which would prevent the bases from sitting evenly on a flat and solid surface. Just two badly preserved fragments were identified at Kuwait, compared to 38 from Unguja Ukuu (Fig. 3.78, 3.79, 3.80).

	Kuwait	**Unguja Ukuu**
No. Fragments	2	38
Diameter (range)	40 mm	25 - 40 mm
Base thickness	2 mm	1.3 - 4.6 mm

FIG. 3.78. SUMMARY OF FLAT TO ROUNDED BASES

The better preserved examples from Unguja Ukuu range in diameter from 25 to 40 mm. That said, the transition from base to side-wall is not marked, and in all likelihood proceeds at a gradual angle, thus resulting in vessel diameters much wider than the surviving portions of the bases indicates. It is much easier to measure the thickness of the bases at their centre point. The vast majority have been thickened in relation to the base edges but remain thin. In the Kuwaiti assemblages, K-GL1379 measures 2 mm. At Unguja Ukuu, base thickness ranges from 1.3 mm (U-GL2046) to 4.6 mm (U-GL166), averaging around 3 mm. Where preserved in the Unguja Ukuu assemblage, the pontil marks associated with this base type are exclusively solid, and often narrow, ranging from a diameter of 3 mm (U-GL497) to 8 mm (U-Gl2632), with an average of 5.5 mm. A number are quite prominent, including U-GL166, U-GL307, U-GL605, U-GL1015, U-GL1357, U-GL1361, U-GL2093, U-GL2589, U-GL2590, U-GL2611, U-GL2622, and U-GL2597. Many of the others possess what might be described as 'negative' pontil scars, where the initially prominent pontil mark has been broken off, whether by the glassworker as part of the finishing process, or subsequently during use (e.g, U-GL532, U-GL570,U-GL U-GL773, U-GL2526 and U-GL2632). Often the pontil mark is off centre.

In terms of colour, there is a strong association between this base type and the IB colour group in the Unguja Ukuu assemblage, though there are small numbers of CL and OG examples. None of the fragments are themselves decorated. On the basis of quantity and metal alone, it is likely that it is possible to connect this base type with the *plain rims (rounded)* open vessels discussed above. That said, no intact profiles exist to confirm this hypothesis.

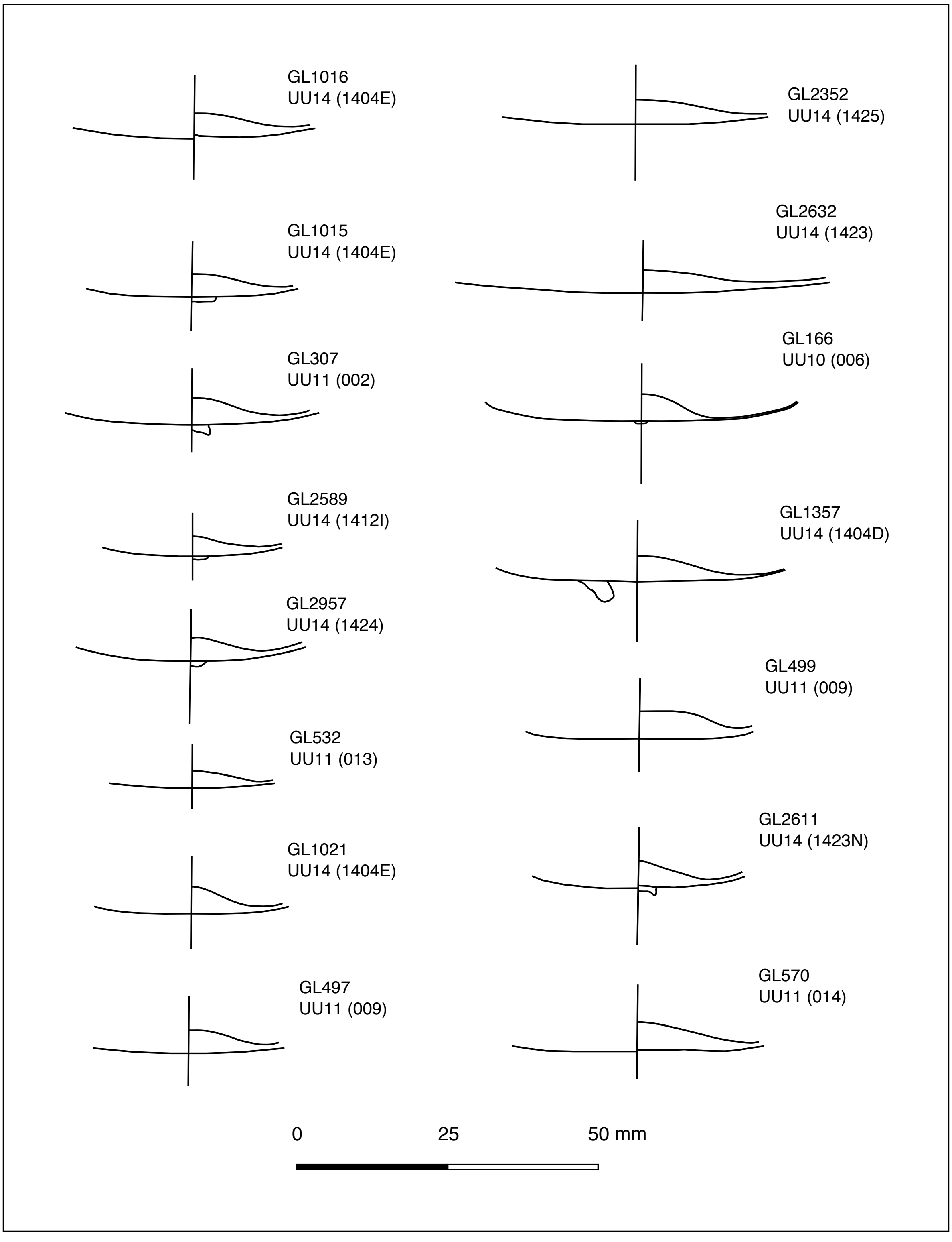


FIG. 3.79. FLAT TO ROUNDED BASES FROM UNGUJA UKUU

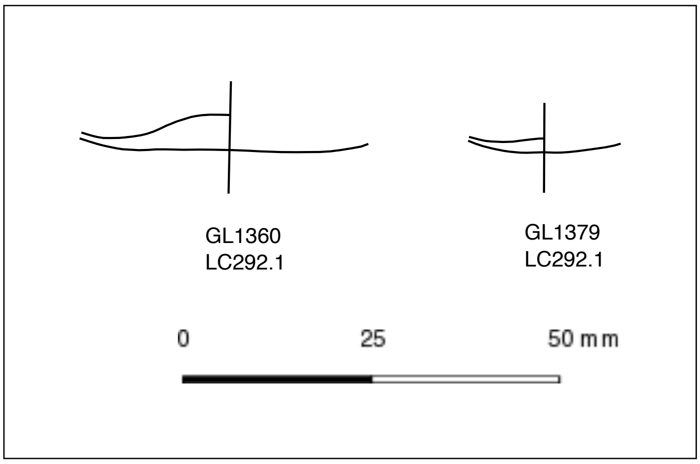


FIG. 3.80. FLAT TO ROUNDED BASES FROM KUWAIT

3.3.9. Internally-knobbed base

This extremely unusual type is defined according to the presence of a large circular knob or boss which has been applied to the interior central portion of a thick and rather flat base (Fig. 3.81). The type is not present at Unguja Ukuu and only once identified at Kuwait. Regarding the Kuwaiti example, K-GL1529 represents the central part of a more-or-less flat base of unknown diameter, which has had a large 'knob' or boss of glass (D. 40 mm; T. 6.5 mm) applied to its internal face. This knob is well finished, and appears to be in the same heavily weathered LGB metal as the main vessel. The underside of this base reveals the edge of a solid pontil mark. Owing to the little of this vessel which survives, it is difficult to make any assumptions based on this fragment alone. That said, it is possible K-GL1529 represents a plate or shallow bowl. It is almost certain that this vessel had an open form, otherwise it would have been difficult for the glassworker to apply the knob. Whether the knob was purely decorative or functional is difficult to determine, though it is hard to see a functional purpose that makes sense.

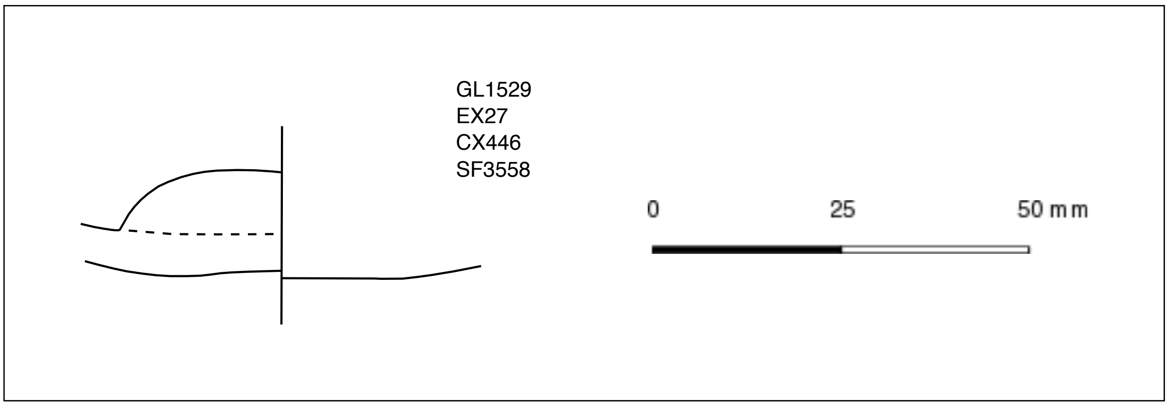


FIG. 3.81. INTERNALLY-KNOBBED BASE FROM KUWAIT

3.3.10. Internally-stepped base

As with the above type, *internally-stepped bases* are very rare, and only a single example has been identified at Kuwait, with none from Unguja Ukuu. The key characteristic is an internal step or ridge which follows the internal circumference of the side walls and marks the transition from walls to base (Fig. 3.82). The working process behind this feature is a little unclear, though probably involved the application of a trail or a complex pattern of folding. Within this defined base area is an additional circular recess, which has presumably been achieved by cutting or grinding the surface.

The sole Kuwaiti example, K-GL1434 consists of a slightly pushed-up base (D. 70 mm) distinguished by the presence of an internal 'step' (T. 6 mm) demarcating the transition from base to side wall. In the central part of the base a circular recess (D. 20 mm) has been *cut* or *ground* into the interior surface. Again it is likely that this form was associated with a small open vessel (D. 70-80 mm), with a mouth wide enough to allow for careful cutting of the central recess.

FIG. 3.82. INTERNALLY-STEPPED BASE FROM KUWAIT

3.3.11. Pontil pads

The term *pontil pad* refers to the technique of applying a small, normally circular pad of glass to the underside of the base of a vessel (Fig. 3.83). Rather than providing a flat base, here the purpose of the pad is to facilitate affixation of the pontil, allowing for the finishing of the vessel. It is unclear why in some cases it was deemed necessary or desirable to employ a *pontil pad*, rather than fixing the pontil directly to the vessel. Perhaps reasons of efficiency or concern with the delicacy of a vessel were in mind, or even to provide something of a flat base in the process. The technique is not present at Unguja Ukuu.

Within the Kuwaiti assemblages, all three of the *pontil pads* are slightly different from one another. K-GL1313 has been applied to a thick-based CL vessel (T. 10 mm). This *pontil pad* (D. 17.5 mm; T. 2 mm) hosts a hollow pontil mark (D. 9 mm), and has been neatly finished after application. Such finishing, coupled with the fact that this thick-based vessel could easily support a pontil on its own, seems to suggest that the use of the pontil pad was a stylistic consideration in this case. K-GL1868 consists of a rather crude pontil pad (D. 22.3 mm; T. 4.5 mm), which has been wrapped around the rounded base of a thick-walled vessel, the surviving diameter of which is less than the applied pad (D. 17 mm; T. 4.5 mm). K-GL2128 consists of a circular pad (D. 22 mm; T. 1 mm), the underside of which exhibits a prominent solid pontil mark (D. 6.5 mm) meaning that the finished vessel could not have rested evenly. This discounts the theory, at least in this case, that the *pontil pad* served as a means of affixing a pre-fabricated flat base. Indeed, it also hammers home the idea that not all vessels were intended to be sat steadily on a flat surface on their base, rather some would have been stood with their mouth face down, held or supported on a stand or in some other support.

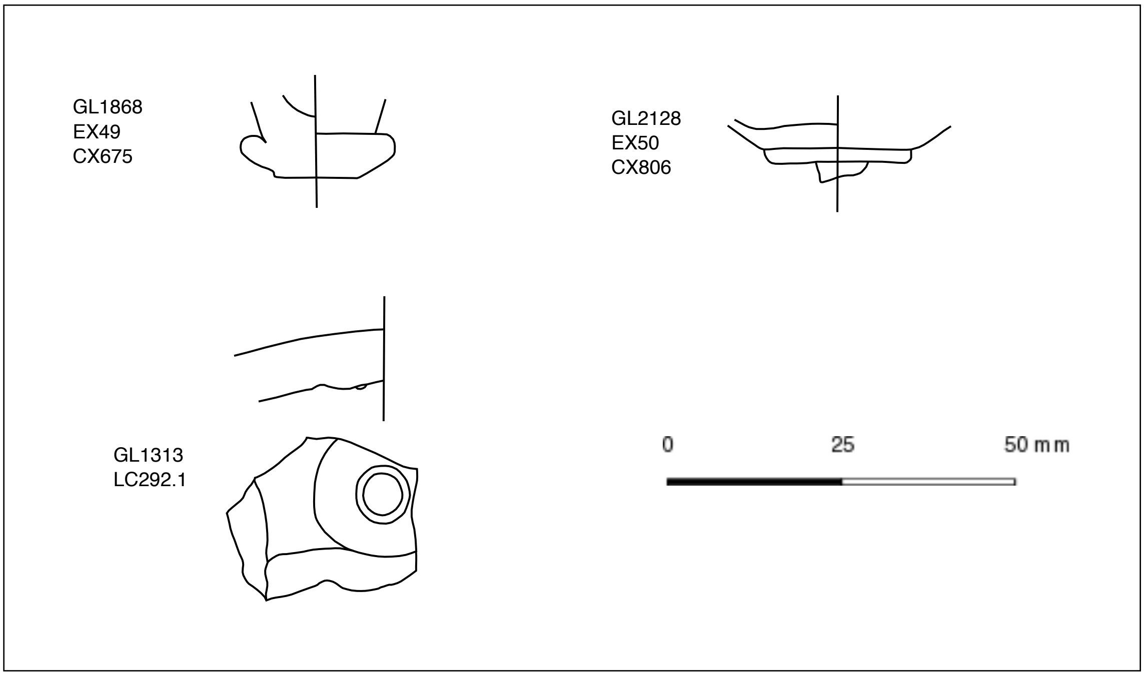


FIG. 3.83. PONTIL PADS FROM KUWAIT

3.4. Miscellaneous Types

3.4.1. Internal body folds

This type is defined by the presence of folds which protrude from the internal walls of the vessel. In most cases the folds have not been squashed tight, leaving hollow barrels within. The exact working process is unclear, but it could be that the blown vessel was pincered in some way to begin the fold, at which point the vessel was effectively squashed until the fold was complete. Just two such fragments were found in Kuwait, compared to eight at Unguja Ukuu (Fig. 3.84, 3.85). Regarding those in the Kuwaiti assemblages, K-GL823 has an internal diameter of 60 mm and an external diameter of 75 mm, reflecting a fold length of 8.1 mm and thickness of 4.1 mm. K-GL2131 also has an internal diameter of 60 mm and an external diameter of 72 mm, with a slightly shorter fold length of 6.4 mm and thickness of 3.3 mm. Both consist of weathered LGB glass.

	Kuwait	Unguja Ukuu
No. Fragments	2	8
Vessel Diameter (ave.)	73.5 mm	98.57 mm
Fold Length	7.25 mm	-
Fold Width	3.7 mm	-

FIG. 3.84. SUMMARY OF INTERNAL BODY FOLDS

For those fragments from the assemblage at Unguja Ukuu, diameters range widely from 60 mm (U-GL1630) to 140 mm (U-GL281 and U-GL1344), with the remaining fragments measuring 90 mm (U-GL161, U-GL534, U-GL671) and 100 mm (U-GL2858). In terms of the folds themselves, the fold length ranges from 1.2 mm to 7 mm, averaging 3.6 mm, while fold thickness ranges from 1.1 mm to 2.8 mm. Interestingly, there does not seem to be any correlation between fold size and the overall diameter. Indeed, at Unguja Ukuu, one the fragments with the widest diameter of 140 mm (U-GL281) also has the shortest fold length at 1.2 mm, while the fragment with the smallest diameter of 60 mm (U-GL1630), has the longest fold length at 7 mm. Nor does there seem to be any obvious relationship between fold length and thickness. All the Unguja Ukuu examples are in the distinctive IB metal group.

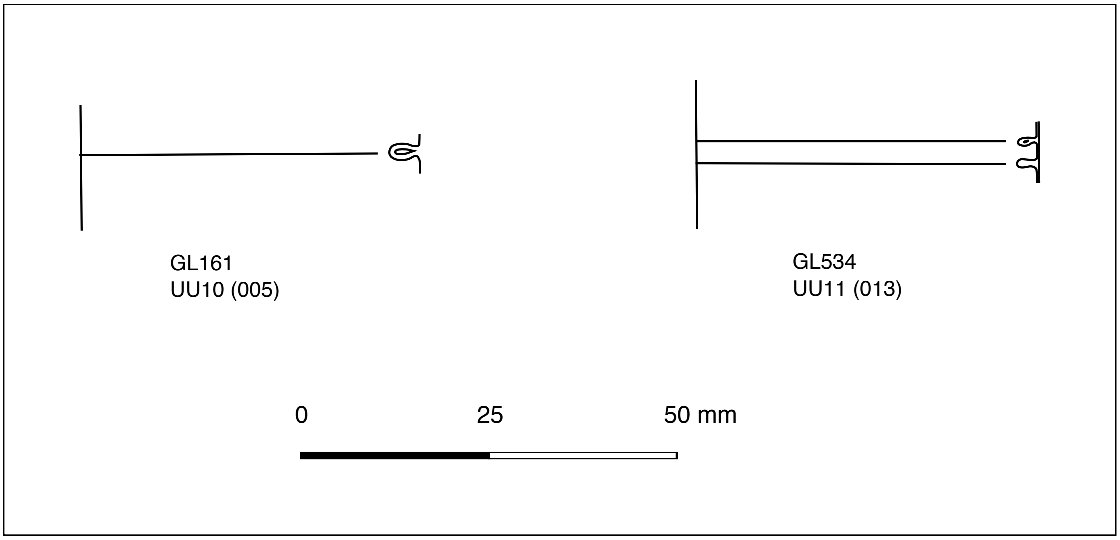


FIG. 3.85. SINGLE AND DOUBLE INTERNAL BODY FOLDS

External body folds are well known in both Roman (see Price & Cottam 1998: 32-3) and Islamic glassware, such as at Kilwa in Period IV (Chittick 1974: 401, 411, figs. 155n, 160c-d), however the *internal body fold* appears much more rarely. Several unpublished examples can be seen in drawings from Siraf (Jennings n.d.). The internal fold creates a constriction in the vessel, and this probably explains its purpose. A constriction might be useful for sealing by providing a ledge upon which to set a stopper. Alternatively, it may have functioned as a measurement line. The exact function is unclear in the absence of knowledge of the overall vessel profile. It is likely the fragments belonged to small open vessels of the same diameter, however one cannot be certain. It is also not clear whether the fold was made towards the top, middle or lower part of the vessel.

3.4.2. Applied feet

The type *applied feet* refers to the tradition whereby small droplets of glass are applied to a vessel, normally around the base, to provide some form of decorative or practical footing (Fig. 3.86, 3.87). This technique can be difficult to identify in archaeological assemblages, owing to the propensity of such delicate features to break off from the main vessel. As such, it is normally necessary to identify droplets as *applied feet* on the basis of being flattened at one end (where the droplet was affixed to the main vessel) and rounded or otherwise unfinished at the other. Often they were applied in combinations of twos and threes. It can be difficult to distinguish between droplets which were applied as feet and those which were purely decorative. Four fragments were interpreted as such at Kuwait, with just one at Unguja Ukuu.

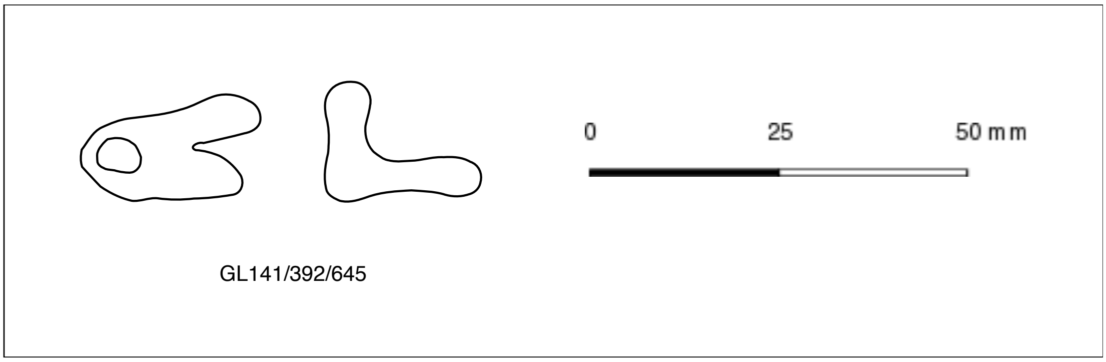


FIG. 3.86. APPLIED FOOT FROM KUWAIT (THREE FRAGMENTS JOIN)

Regarding the applied feet found among the Kuwaiti assemblages, K-GL415 is tooth-shaped (L. 13.2 mm; W. 5 mm; T. 3 mm), and composed of two distinct metals: a CL glass, joined to and partly overlain by a TQ glass .This fragment shows evidence of a slight rounding from erosive processes while having been exposed at the surface. In contrast, K-GL141/392/645 represents three fragments which possess fresh breaks and can be joined to create a three-pronged foot (L. 21 mm; W. 13 mm; H. 16 mm; T. 5 mm), produced in a TQ glass. Each of the prongs has a single tooled dimple on its inner side, probably representing the mark left by the tool used to apply the foot to the main vessel. It is likely that the two adjacent prongs were joined to the main vessel, leaving the third to make contact with the surface.

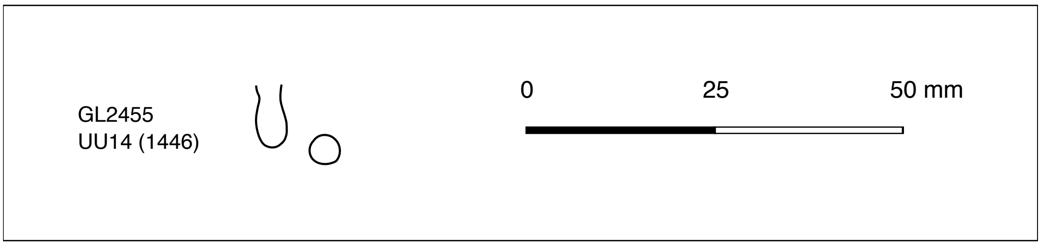


FIG. 3.87. APPLIED FOOT FROM UNGUJA UKUU

A single droplet from Unguja Ukuu, U-GL2455, has been interpreted as an applied foot. This droplet measures 9.1 mm in length and has a general diameter of 3.2 mm. It is however broken at one end. A small indentation or even perforation is visible in the area of the break. This is reminiscent of the indentations seen on K-GL141/392/645 in the Kuwaiti assemblage. The purpose of applied feet is presumably to provide a stable footing for the associated vessel. While the most likely interpretation is that these fragments had a practical function, it is of course possible that they represent decorative rather than functional additions.

3.4.3. Chunks

The rather ambiguous term of '*chunks*' refers to those fragments which are large and irregular in size, and cannot be said to be easily reconcilable with any vessel part. No 'chunks' obviously unrelated to a vessel form are present at Unguja Ukuu, with just one in Kuwait

The Kuwaiti *chunk*, K-GL139, far exceeds any other fragment in size (T. 17 mm). It is unclear whether it formed part of a vessel or otherwise. One side is smooth and may show a slight convex curvature, the other is flat and rough. The glass itself is of an EG metal and contains many pinprick air bubbles. Trade in raw glass ingots is certainly something that took place during the Early Islamic period (see §1.2.2). This practice is required, even over short distances, by the proposed distinction between places of glass production and glass working. Indeed, long-distance exchange in glass ingots can be seen in considerable quantity in the Serce Limani shipwreck (Bass 1984). As the Kuwaiti *chunk* does not seem to belong to a vessel of any kind, yet nor does it have an obvious function, it is tempting to consider these fragments as ingots of raw glass, leading into ideas of a trade in raw glass that was intended for secondary working into vessels or other glass objects. That said, as only a single such irregular chunk has been identified in the Kuwaiti assemblages, this is an insufficient amount to argue for any secondary working at the site or a regular trade in glass fragments. It is of course possible that this fragment simply belongs to part of a thick and large vessel, and has been distorted by weathering since deposition.

3.5. Decorative techniques

3.5.1. Millefiori or mosaic glass

Millefiori glass is a rare component of the Early Islamic glass tradition, but owing to its decorative nature is disproportionately well understood.The production of *millefiori* vessels first involves the creation of canes with multi-coloured cross sections through the consecutive application of coats of different glass melts around a central core. From the cane, thin slices are cut and subsequently placed together into a mosaic pattern. Finally these are either fused at high temperature into a disc and slumped over a mould or fused within a mould itself. No *millefiori* glass is present in the Kuwaiti assemblages, and only a single fragment has been found at Unguja Ukuu (Fig. 3.88).

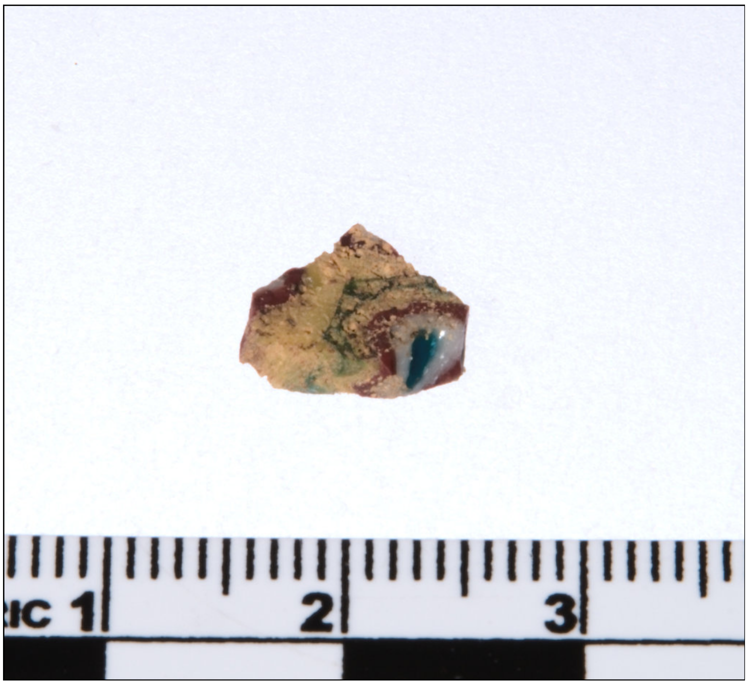


FIG. 3.88. MOSAIC GLASS FROM UNGUJA UKUU

The single fragment of *millefiori* glass from Unguja Ukuu (U-GL3145) is rather small, with an estimated surface area of only 50 mm^2. Around half of one complete cane slice is preserved, revealing a 'bulls-eye' pattern of concentric rings of different coloured glass, each about 0.5 mm in width. The surviving pattern starts with a bright turquoise core, with consecutive rings of white, red, yellow, green, then yellow. The edge of a second cane slice is visible along one edge of U-GL3145, suggesting a cane diameter of 7-8 mm, taking the inevitable distortion of the working process into account.

It is possible that a 'bulls-eye' pattern, that is, one central colour surrounded by multiple other colours in rings, is typical of Early Islamic *millefiori* (Carboni & Whitehouse 2001: 147). Although *millefiori* glass has a great depth of antiquity, first appearing in Egypt c. 1400 BC, as well as appearing during the Hellenistic and Roman periods, it does not appear to have ever remained fashionable for very long, and the latest datable 'Roman' examples appear no later than the 4th century AD (Carboni 2001: 29-30; Carboni & Whitehouse 2001: 147; Auth 1990). Thus the reintroduction of the technique in the Early Islamic period appears to have occurred independently from the earlier precedents, though 'heirloom' examples may certainly have been an inspiration (Carboni 2001: 30). *Mosaic/millefiori* glass does not appear in the Islamic world much later than the 9th-10th century, and was not seen again until the 15th century in Venice (Carboni 2001: 29).

The best dated example of the mosaic tradition comes in the form of floor tiles from the throne room of the caliphate residence of Jawsaq al-Khaqani at Samara, at one time the Abbasid capital of Samarra, built between AD 836-42, indicating that the technique was in use during (but not limited to) the 9th century (Lamm 1928: 106-10, nos. 302-12, pls. 8-9). In addition to Samara, a single gaming piece was found at Nishapur (Kroger 1995: 113, n. 162). The possibility of a mid or late-8th century AD date is suggested by finds of mosaic glass at Tulu al-Ukhaydir (Goldstein 2005: 86), while the style has also been identified in archaeological contexts at Dvin in Armenia in association with 7th-9th century AD Iraqi imports (Djanpoladian & Kalantarian 1988: pls. 29.1-2), as well as at Susa (Lamm 1931: 366-67, pl. 79.10). In East Africa, Fleisher and LaViolette mention, but do not illustrate, a fragment of *millefiori* from Tumbe, Pemba Island (Fleisher & LaViolette 2013: 1157). In the Red Sea region, a number of bowls and fragments are known from museum and private collections, including a molar flask purchased in Cairo, thus hinting at a tentative Egyptian distribution (Whitehouse 2001; Carboni 2001).

3.5.2. Scratch-engraved glass

Scratch-engraving is a form of cut decoration. The technique involves the incision of thin, shallow lines onto the finished vessel surface with a hard point, perhaps a diamond or other mineral with a hardness in excess of 7 on the Mohs scale (Carboni & Whitehouse 2001: 156). *Scratch-engraved* glass is widely distributed throughout the Early Islamic world, and yet the range of decorative motifs is quite standardised, consisting mainly of geometric and floral patterns (sometimes filled with diagonal hatching) arranged between bands of vertical and horizontal lines. Kufic inscriptions are not unknown (see, for example, a goblet help in the Metropolitan Museum of Art, New York, with an inscription reading: “Blessings from Allah to the owner of the goblet. Drink!” (Carbon & Whitehouse 2001: 164-5). The technique is normally employed on cobalt blue glass, though other dark colours were also used, as dark glass shows up the decoration better (Kroger 2005: 140). The greatest stylistic variation is perhaps in the quality of execution which showed the most variety, ranging from the cursory to the sophisticated.

The technique is not present in the Kuwaiti assemblages, with three fragments from Unguja Ukuu (Fig. 3.89). U-GL90 is no more than 85 mm^2 in area, yet possesses an intricate level of well executed *scratch-engraved* decoration. The fragment is divided up by bands of parallel and perpendicular straight lines. Within one of these sections are three triangles in a chevron pattern. The glass is of a BL colour. U-GL2244 is a rim fragment of the '*stepped rim*' variety (§3.2.1.). Again a chevron pattern of triangles has been engraved within a section defined by two horizontal and parallels lines. In this instance, the interior of the triangles has been filled with a diagonal hatching. The tip of the triangles reaches up to the bottom of the thickened step. Again the glass is of a BL colour. Finally, there is U-GL2846. Although this is the largest of the three fragments, here the *scratch-engraved* design is far less complex, consisting of no more than two straight lines which are slightly off-parallel. The glass is of a similar BL colour metal.

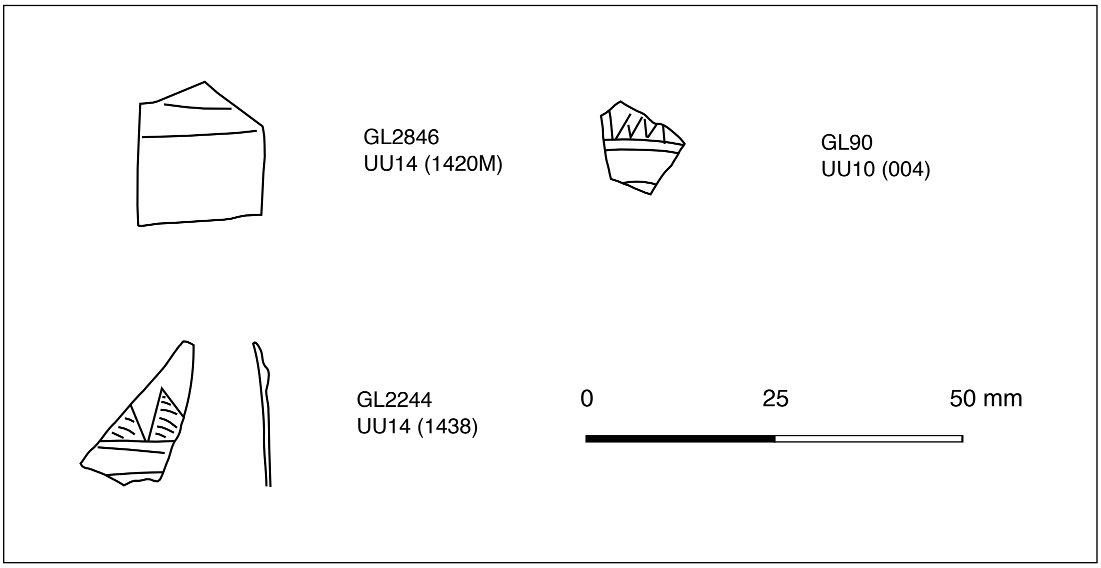


FIG. 3.89. SCRATCH-ENGRAVED GLASS FROM UNGUJA UKUU

As the the *scratch-engraved* technique is widely distributed, it is, as a result, well researched and one of the better dated components of Early Islamic glassware (see Hadad 2000; Kroger 2005; Carboni & Whitehouse 2001; Carboni 2001; Whitehouse 2010). Generally, the contextual provenance of most examples of scratch-engraved ware strongly suggest a 9th century AD date. The most useful in this regard are those from the crypt of the Famen Temple, Shaanxi Province, China, where six cobalt blue plates with detailed engravings containing traces of gilding were discovered in association with other precious items (An Jiayao 1991: 123-4, figs. 3-8; Jiang Jie 2010: 185-86, pls. 1-6; It is unknown where and when the gilding was applied). The crypt is known to have been sealed in AD 874, thus associating *scratch-engraving* with the 9th century AD. Only two sites suggest dates prior to the 9th century AD: the two fragments from Beth Shean's 'Umayyad period' (Hadad 2000: 63), and a similarly small quantity from Susa's Stratum 3, controversially-dated to AD 700-750 (Hardy-Gilbert 1984: 143-44). Although a not insignificant number of fragments have been recovered from contexts later than the 9th century AD, these are rarely secure and appear, for the most part, to be residual.

In East Africa, *scratch-engraved* glass has possibly been identified at Manda, Period I (Morrison 1984: 163, fig. 131e). In Iraq, *scratch-engraved* glass has been identified at sites including Samara (Lamm 1928: 79-82, nos. 251-59), at Tulul al-Ukhaidir (Finster & Schmidt 1976: 133, 139, no. 2g, fig. 67f; Abdul Khaliq 1976: nos. 42-3, figs. 33-4, pl. 4), at Nippur (Meyer 1996: 249, fig. 4, no. 168). In Syria, North Africa and the Levant at Qal'at Seman (Dussart 2003: 177, fig. 6.3), Fustat (Shindo 2003: 184, fig. 6), and in 9th-10th century AD rubbish deposits at Raya (Shindo 2003: 184-184, fig. 5). In Iran, at Nishapur (Hauser & Wilkinson 1942: 105-6, fig. 33; Kroger 1995: 116-19, nos. 164-65), and Susa (Lamm 1931: 366, pl. 77.2), including in Hardy-Gilbert's stratum 3, apparently dated AD 700-750 (Hardy-Guilbert 1984: 143-44. Further afield, *scratch-engraved* glass has also been found at Dvin in Armenia (Djanpoladian & Kalantarian 1988: pl. 27.15), at Corinth (Davidson 1952: 88, no. 748), in the west African city of Gao, Mali (Insoll 1998: 80-2, fig. 3), possibly n Malaya (Meyer 1996: 249), and, as mentioned above, in the crypt of the Famen Temple, Shaanxi Province, China (An Jiayao 1991: 123-4, figs. 3-8; Jiang Jie 2010: 185-86, pls. 1-6.). A large question remains regarding the geographic origins of scratch-engraved glass, with its widespread distribution preventing a definite association with a specific place. This, along with the fact that chemical analysis has shown that both natron and plant ashes were used as fluxes, suggests the existence of multiple production centres (Carboni 2001: 80).

One of the *scratch-engraved* fragments, U-GL2244, can be directly associated with the type of open vessels with *stepped rims* (see §3.2.1.). The other fragments give no clue as to overall vessel form, however they are thin and likely represent delicate vessels, allowing us to discount the large blue plates such as seen in the Famen Temple. That said, this still leaves a large range of vessel types to which these fragments may belong, as the variety of open and closed forms identified in the external parallels section shows.

3.5.3. Trailed glass

The technique of *trailing* is one of the most easily recognised methods of glass decoration. This method is inherently simple, and involves little more than the application of a thin strand or 'trail' of glass onto another, usually a complete vessel. This method is not purely decorative, but also used to affix handles, ring bases and other quasi-functional features. Owing to the variety encapsulated within this technique, this type contains a wide range of distinctive fragments. Ten trailed fragments were found in Kuwait, with 14 from Unguja Ukuu (Fig. 3.90, 3.91).

Four main uses of the *trailed* technique are apparent in the Kuwaiti assemblages, including: a trailed rim; the trailing of thick threads around cylindrical bottle necks; the trailing of thin threads onto the main vessel body; and the trailing of protruding features, which may be decorative and/or functional. Two trailed rims, K-GL360 and K-GL1234, consist of a technique whereby the rim has been finished with the addition of a trail of glass around the tip, often composed of a different melt and colour. K-GL360 belongs to an open vessel form with a rim diameter of 60 mm and a relatively vertical upper body. The mainstay of the vessel was produced in a CL glass, to which was added a trailed rim in a bright BL metal. K-GL1234 possesses a much fainter example of the same technique. The trail is not merely decorative but serves to thicken the rim.

The coiling of thick threads around a cylindrical neck is seen on four fragments, K-GL1642, K-GL1901, K-GL1902, and K-GL1986, all of which are assumed to belong to the same original vessel. The neck in question is of a type belonging to a closed vessel, but for which there are no close parallels elsewhere among the Kuwaiti material. The neck is of c. 20 mm diameter, and each of the the trailed strands ranges from 3-5 mm in cross-section. Each of these trails has been flattened every 4 mm, using a small flat headed tool. In each case the glass is of an identical weathered LGB colour. Bottle necks wound with trailed threads are common at Caesarea and elsewhere in the Levant (Pollak 2003: 165-166, fig. 1).

The application of thin trails to the main body of vessels is seen in a number of cases. With K-GL1994, the thread is 1 mm thick, but the pattern in which it has been trailed is not discernible. Regarding K-GL2032, however, this 1.5 mm thick thread has been trailed into a distinctive looped pattern. Finally, both K-GL597 and K-GL1082 represent trails which would originally have protruded from the vessel to which they had been applied. Both have broken away from their host vessel. K-GL597 is LGB in colour and would have protruded from its host in something like an undulating or wave pattern. K-GL1082 is more distinctive. TQ in colour, this fragment is flat on one side where it was applied to the main vessel and rounded on the exterior. One end is broken, and is thinner but wider than the intact end. It is possible that K-GL1082 was purely decorative, however it is not out of the question that this fragment represents the bottom end of a trailed looped handle.

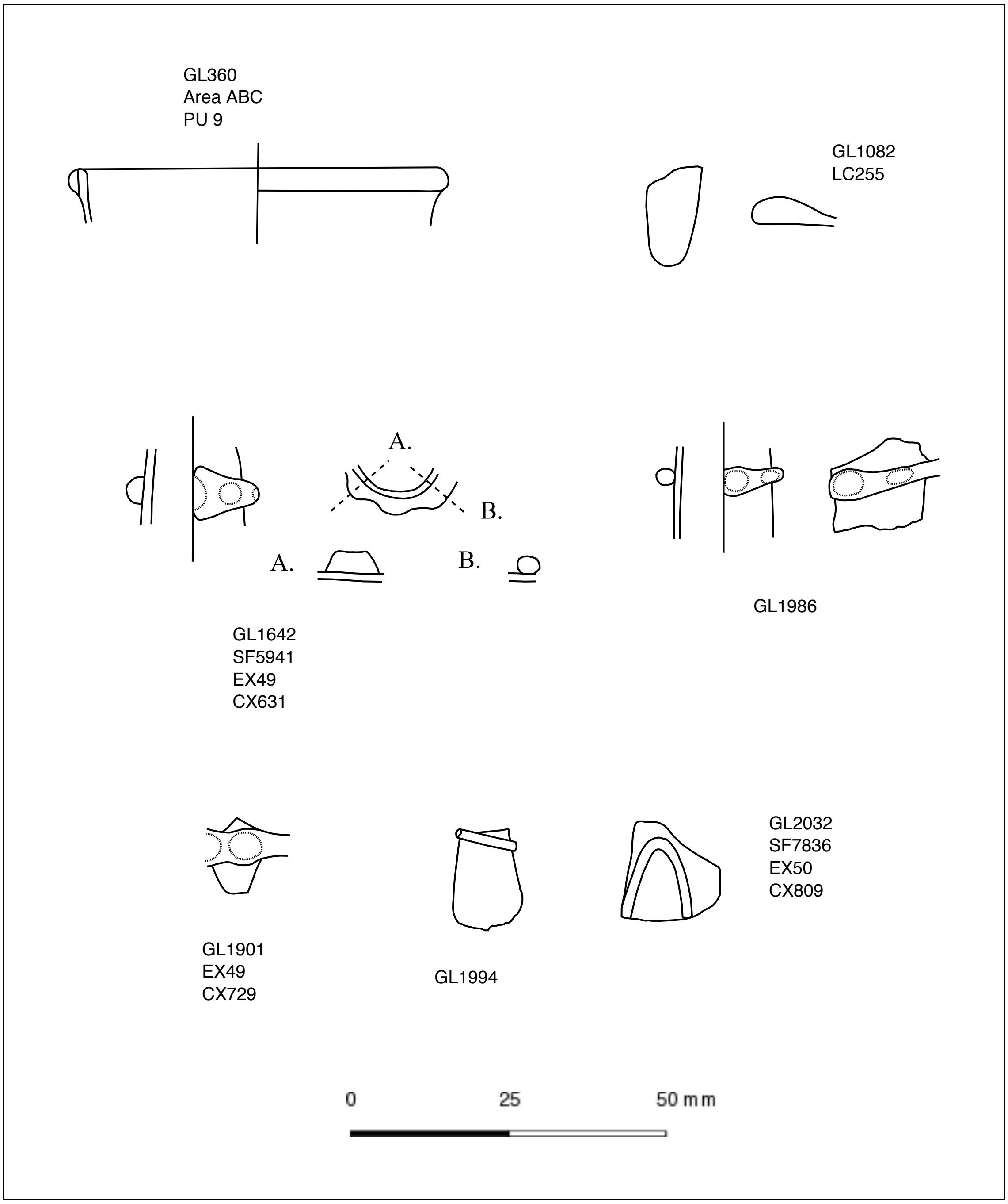


FIG. 3.90. TRAILED GLASS FROM KUWAIT

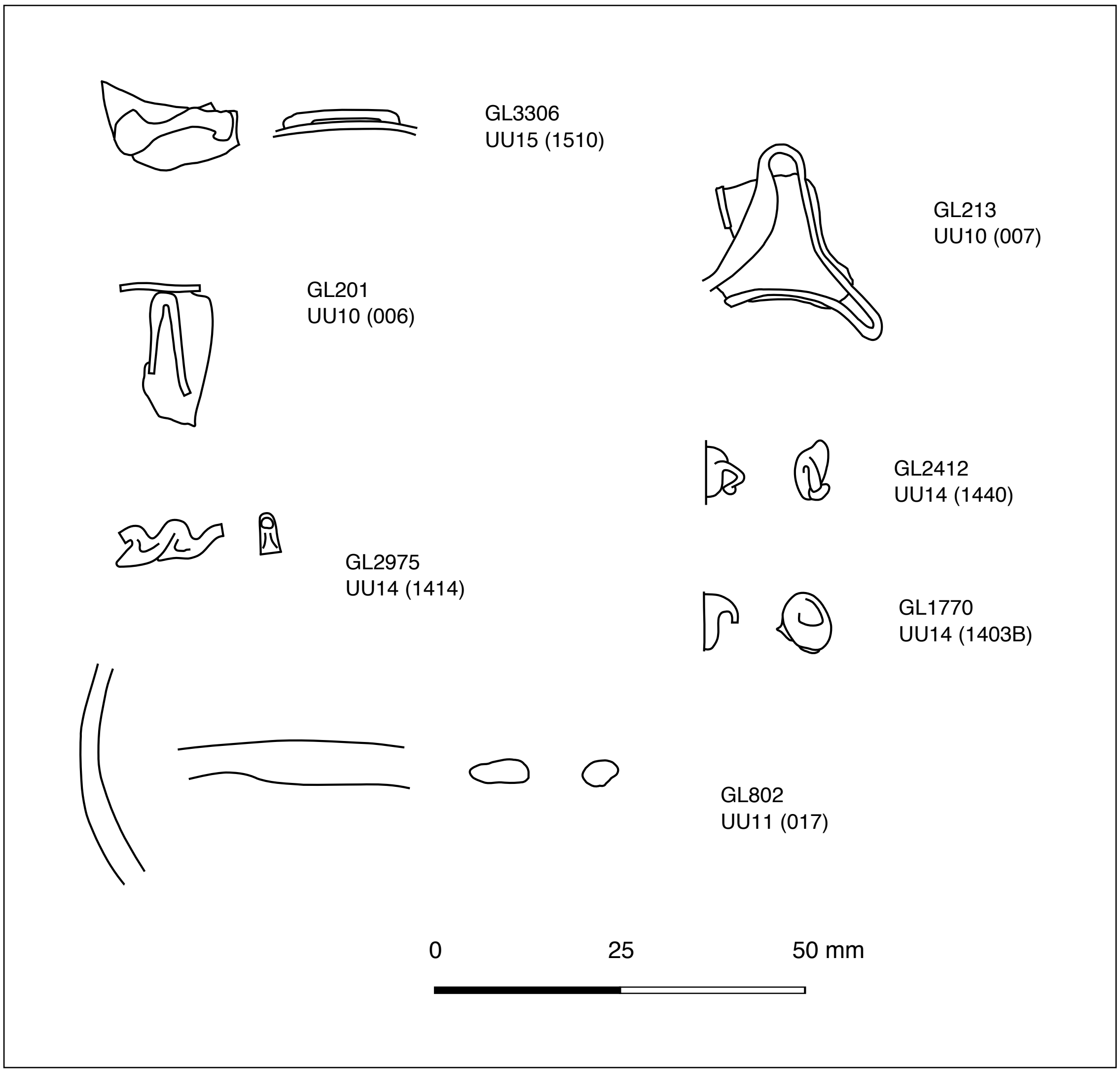


FIG. 3.91. TRAILED DECORATION FROM UNGUJA UKUU

Again, several different uses of the trailed technique can be identified in the Unguja Ukuu assemblage. There are those where the trailed threads are intended to protrude from the host vessel, those where the threads are trailed in a flat pattern, as well as a possible trailed handle. Among the protruding trails, the most distinctive is U-GL2975. This OG fragment is trailed into a zigzag pattern, which would have been attached to the vessel along its long axis, and protruded from the vessel with a height of 5 mm. Three zigzags survive, though the fragment is incomplete with a length of 13 mm. The remaining protruding trails (U-GL1770, U-GL1856 and U-GL2412) are much smaller, and represent either small stand-alone loops or broken parts of larger trails such as U-GL2975. Although broken, they give the impression of miniature lugs or handles, though are clearly too small to have been of practical value, with each no more than a few millimetres across. They appear in OG, IB and BL metals respectively. Among the trails laid in a flat pattern, for U-GL3461 and U-GL2413 only the trailed threads are preserved. The former is thin, 1.7 mm in diameter, and TQ in colour, and seems to have been applied to a CL glass owing to the preservation of a small part along one side of the trail. U-GL2413, meanwhile, is thicker at 1.8 mm in diameter, and represents an OG glass metal and has been applied to a vessel of the same colour group. Interestingly this trail has been flattened in one part in a similar manner to fragments K-GL1642/K-GL1901/K-GL1902/K-GL1986 from Kuwait. That said, unlike the Kuwaiti fragments, U-GL2413 has been applied to a vessel body rather than neck.

There are four flat trailed fragments which survive applied to their host vessel but for which no obvious pattern can be discerned. U-GL718 and U-GL3257 both fit this bill, and appear as little other than 'blobs' of OG glass applied to bodies of a similar metal. U-GL3306 is different in that the trail is more linear, can be measured as 2 mm in diameter, and consists of a RD metal applied to an OG vessel. U-GL3340 is the most difficult fragment to understand, as at least two distinct threads (0.9 mm in diameter and a mix of green and red in colour) can be seen to have been trailed onto a RD fragment of glass that may itself represent a larger trailed thread.

There are a number of fragments with trailed decoration applied flat and in a looped pattern. U-GL3543 is the most slight, with only the trailed portion surviving. This OG thread measures 1.3 mm in diameter, and is trailed in a tight loop of which the upper portion remains intact. U-GL213 exhibits a more complex tripartite looped pattern, with an additional trailed thread in a more linear arrangement. The looped trail is of the same OG metal as the vessel to which it has been applied, while the additional linear thread is of a RD metal. Lastly, U-GL201 consists of a CL colour vessel fragment, to which two RD threads have been trailed. One of the threads takes the looped pattern, while the other is linear and joins the first at the top of the loop. Finally, U-GL802 represents a thick trail of TQ colour glass, 7.3 mm at its maximum diameter and surviving at 33 mm in length. This trail is slightly twisted and irregular, and exhibits a minute fragment of clear clear attached at one side. It most likely represents the central portion of a trailed handle. Mostly the trailing is a purely decorative feature, and vessels treated in such a manner can be assumed to have been intended to be items worthy of display, however K-GL1082 and U-GL802 represent possible trailed handles.

3.5.4. Appliqué buttons

The type *appliqué buttons* refers to a tradition whereby normally circular discs of glass are applied to a host vessel as a means of decoration.This type is not present at Unguja Ukuu, with just a single Kuwaiti fragment. K-GL958 is 7.5 mm in diameter and 2 mm thick. The central part of this button has been indented, 2.1 mm in diameter, possibly during the application process. The glass is heavily weathered. *Appliqué buttons* are known to have been applied to a wide range of vessel forms, and as such there is no obvious indication of form based on the presence of a button alone. Regarding the Kuwaiti button, although a small part of the host vessel remains attached the fragment is far too small to say anything about form. In terms of function, appliqué buttons must be purely decorative in that they offer no additional functional utility.

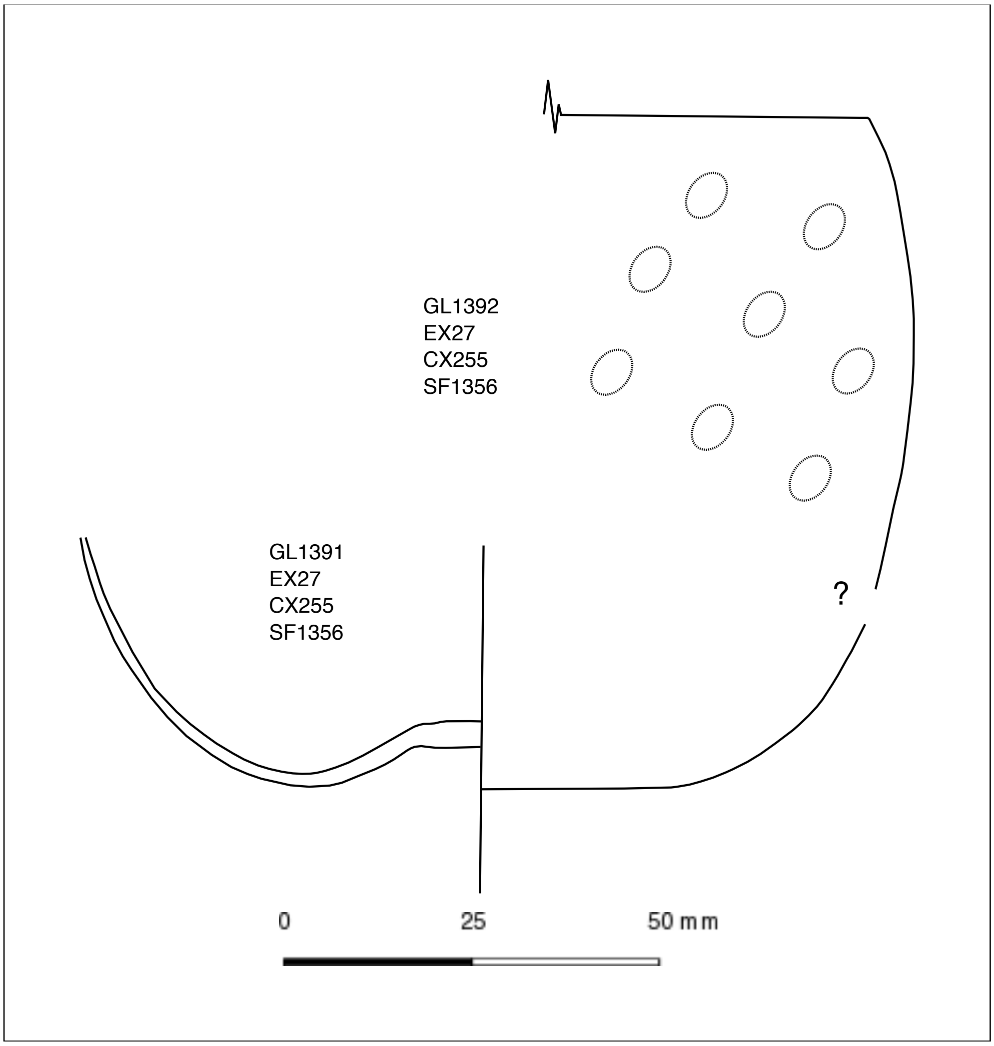


FIG. 3.92. A MOULD BLOWN VESSEL WITH DIMPLED DECORATION FROM KUWAIT

3.5.5. Dimpled glass

This decorative type consists of glass which has been periodically indented or 'dimpled'. The indentations are mostly broad and shallow, and arranged in regular patterns around the vessel body. Two main methods can be used to achieve a dimpled pattern: hand tooling, or the use of a mould. With hand tooling, the dimples are simply effected using a point. Use of a mould can be more complicated. Either the parison is initially inflated within a mould, and then finished outside of it (i.e. mould blown) or a mould is pressed against the outside of the vessel as part of the finishing process (i.e. press moulding). Just one piece of dimpled glass was found at Unguja Ukuu, with 36 fragments from Kuwait.

Most of the dimpled fragments from Kuwait appear to have been mould blown, with 31 representing the same original vessel. That said, fragments K-GL13 and K-GL48 have been hot-worked, specifically having been indented using a hand tool. K-GL13 belongs to the upper body or shoulder of a globular closed vessel. This fragment exhibits three indentations (D. 2 mm) in a triangular arrangement, presumably running in a narrow horizontal band around the vessel demarcating the transition from body to neck. This fragment has not been mould blown but hot-worked, specifically by pressing the fragment with thin, blunt tool slightly less than 2mm in width. The glass is TQ in colour. K-GL48 again belongs to the upper body or shoulder of a globular closed vessel. The shoulder of this vessel is demarcated by a ridge, below which six indentations (D. 2mm) run in a horizontal band. Again, like K-GL13, the indentations have been tooled rather than mould-blown, and the glass is a similar distinctive TQ colour. At Unguja Ukuu, U-GL1984 consists of a CL *push-up base type 5* with six pressed indents around the central part of the base where the pontil would have been attached.

Regarding those fragments that have been mould blown, K-GL230 again belongs to the upper body of a closed vessel. As a result of the mould-blown method, the indentations are shallower and less clearly visible. At least eight indentations are present (D. 3 mm), in a band at least three deep. It is uncertain whether the dimples formed a collar around the upper part of the vessel or indeed covered the bulk of the body, though this latter scenario is the most likely if a mould was used. The glass is of a CL metal and has a milky white, slightly iridescent weathering pattern. K-GL866 is again mould-blown, however this fragment is undiagnostic of form. K-GL1391 to K-GL1419 all belong to a single open vessel with a *plain rim (fine)* (D. 90 mm) and a *push-up base type 6*. The form of this vessel has been discussed above (§3.2.8.). The dimpled effect on this vessel is distinct from that already considered. The dimples are shallow and broad (D. 7 mm) and arranged in such a way as to give the impression that they run in diagonal bands across the vessel. This vessel has clearly been mould-blown. The glass is weathered to the extent that it has lost its glassy nature, with the devitrification extending deep into the metal. K-GL2090 is also mould-blown, however again is undiagnostic of form and heavily weathered. *Dimpled* mould blown glass has been noted in association with *stepped rims* at Nippur in Iraq (Meyer 1996), as well as more generally in Syria at Qal'at Seman (Dussart 2003: 177, fig. 6.5).

3.5.6. Pinched Glass

This type of decoration is easy to identify but somewhat hard to understand in terms of working technique. It is characterised by the presence of raised loops and ridges on the external surface of the vessel. While normally referred to in the wider literature as 'pinched', many of these features appear to have been created by pricking and dragging small portions of the glass into the desired shape. Occasionally this process leaves a small tool mark on the underside of the end of the loop. The technique is common with 13 examples at Unguja Ukuu, but not present at Kuwait (Fig. 3.93).

The looped aspect of this technique is clearly evidence on a number of fragments from Unguja Ukuu, specifically U-GL715, U-GL717, U-GL764, U-GL765, U-GL1855 and U-GL1999. In each case the looped end is raised in relation to the mainstay of the vessel fragment, but by no more than 1 mm in any case. The looped ends preserve a small indentation, which reveals where the narrow tool has been applied when dragging across the vessel surface. In most other cases (U-GL470, U-GL712, U-GL806, U-GL832 and U-GL1332), a looped pattern can be inferred yet only the side ribs of the pattern survive with the looped end missing. The two remaining fragments, U-GL710 and U-GL2933, represent a somewhat different proposition. In these cases the surface of the glass has been pinched and raised upwards, leaving the characteristic tool mark, but in neither example has the glass been dragged into a looped pattern. Why this latter stage of the working process has been omitted in these two cases is uncertain, but there is no structural reason at least why this would have been deemed unsuitable in either case. In each case, this technique has been effected on IB glass of good quality.

The looped patterns created by this technique cannot be associated with any diagnostic rim or base types, not to mention vessel forms. That said, there is a strong association with the distinctive IB glass metal, which in turn has been shown to be itself associated with open vessels with *plain rims (rounded)* and *flat to rounded bases*. As such it is tempting to see these decorated fragments as belonging to such vessels. In terms of the looped pattern, it is difficult to argue for any practical purpose as opposed to a purely decorative function. It is possible that a number of loops situated around a vessel might act as small 'lugs' allowing it to be hung using small hooks, but these features seem to be too fragile and small to act as such. In the Levant, many bottles with a similar decoration have been identified at Fustat (Scanlon & Pinder-Wilson 2001: 66, fig. 33) and at Caesarea, Ramla, Bet Shean and Usais by Rachel Pollak, who sees them as characteristic of the second-half of the 7th century and 8th century AD (Pollak 2003: 165-166, fig. 1.12-13). Likewise, having displayed examples from Qal'at Seman (Dussart 2003: 177, fig. 6.4), Dussart suggests that this technique (there termed 'pincé') is a feature of the late-Byzantine and early Islamic glass traditions - of which there is significant overlap (see §1.2.2).

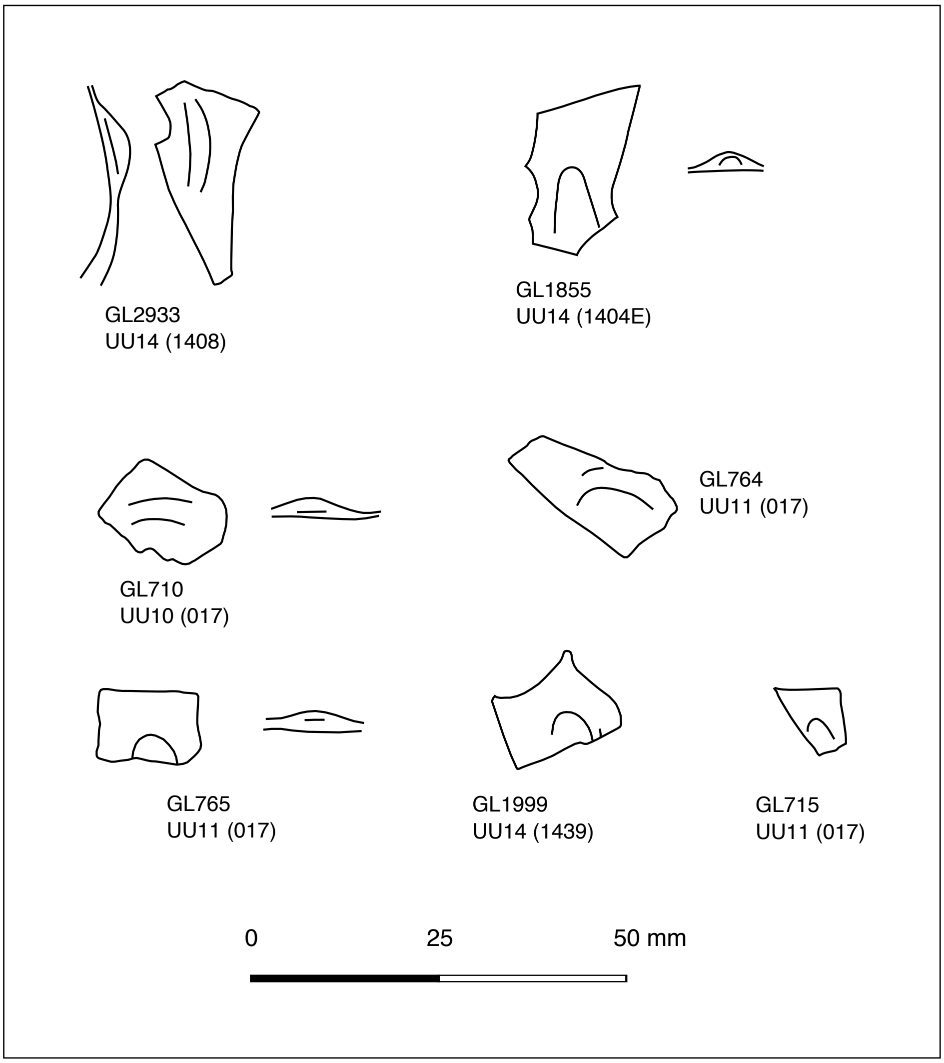


FIG. 3.93. PINCHED GLASS FROM UNGUJA UKUU

3.6. Chapter summary

Chapter Three was designed with the ambition of offering a better understanding of the typological components of the Early Islamic glass tradition, according to the methodological approach established in Chapter Two. As such, the previous sections have proceeded through a detailed typology of the various rim, base, miscellaneous and decorative types identified in the archaeological assemblages from Kuwait and Unguja Ukuu. The results of this research, and the extent to which Chapter Three has achieved its goal, are the focus of the first part of the discussion in Chapter Six (§6.2). In a more immediate sense, the research presented in this chapter forms the basis of the analysis in Chapters Four and Five.

As a prelude to the following chapters and discussion it is worth summarising the relative integrity of the various types, that is, the degree of certainty as to their validity and thus utility (Fig. 3.94). A rating of 'high' indicates a type that is distinctive, standardised and easily identified at other sites. 'Medium' indicates a type that may meet at least two of these criteria, but for which the quantities present are insufficient for greater certainty. 'Low' normally indicates a type defined on the basis of just a handful of fragments, and where there is little external supporting evidence for its designation. This process reveals that a number of types are considered of high integrity, included the distinctive *folded and flattened rims*, *ribbed necks (narrow)*, *stepped rims*, *triangular-beaked rims* and *inwards-folded rims*. As discussed in Chapter Six, it is the types of greater integrity which generally offer the best indicator of the Early Islamic period. Others, such as the *plain rims (thick)* and *plain rims (fine)* are considered of low integrity, representing 'umbrella groups' rather than distinctive types. Such sets of material are problematic in every typology, requiring difficult decisions as to whether to 'lump' or 'split' - a question to which there is rarely a right or wrong answer. Ultimately, these are categories which will likely be refined with further work. Figure 3.94 also summarises the predicted vessel forms and inferred practical functions related to each of the types in the above sections. Uncertainty exists in every case, and the predictions of both form and function are to be treated with caution. That said, starting with the technical features of a given fragment and working towards overall form and function means that future work can allow for adjustments in the latter two categories without requiring a revision of the entire typological system. For now, for want of better data, this thesis will proceed on the basis of the inferred forms and functions summarised below. As such, in Chapters Four and Five the thesis considers the practical and social function of vessel glass in Kuwait and at Unguja Ukuu.

	Integrity of type	Predicted vessel forms	Practical Functions?
Folded and flattened rims	High	Globular bottles	Domestic storage
Ribbed necks (narrow)	High	Small container	Precious commodity storage (liquid)
Ribbed necks (wide)	Medium	Bottle, range of sizes	Domestic storage?
Vertical neck (narrow)	Medium	Small container	Precious commodity storage (liquid)
Vertical neck (wide)	Low	Jug or cup?	Serving (pouring) or tableware (drinking)
Flaring neck (straight)	High	Bottle, range of sizes	Serving (pouring) and storage
Flaring neck (rolled-in rim)	Medium	Jug or bottle	Storage or serving (pouring)
Flaring neck (rolled-out rim)	Low	Jug?	Serving (pouring)
Flaring neck (bevelled rim)	Medium	Jug or cup?	Serving (pouring) or tableware (drinking)
Flaring neck (bulging)	Medium	Small container	Precious commodity storage (liquid)
Flaring neck (wide-mouthed)	Medium	Bottle, range of sizes	Serving (pouring) and storage
Miniature Jar	High	Small container	Precious commodity storage (powder/ paste?)
Constricted neck	High	Small container	Precious commodity storage (perfume dropper?)
Stepped rim	High	Beaker/Bowl, range of sizes	Tableware (eating/ drinking)
Triangular rim	HIgh	Beaker/Bowl, range of sizes	Tableware (eating/ drinking)
Inwards-folded rim	High	Beaker/Bowl, range of sizes	Tableware (eating/ drinking)
Rolled-in rim	Low	Beaker/Bowl, range of sizes	Tableware (eating/ drinking)
Flaring-sided vessel	Medium	Bowl	Tableware (eating?)
Plain rims (rounded)	High	Beaker/Bowl, range of sizes	Tableware (eating/ drinking)
Plain rims (thick)	Low	Beaker/Bowl, range of sizes	Tableware (eating/ drinking)

	Integrity of type	Predicted vessel forms	Practical Functions?
Plain rims (fine)	Low	Beaker/Bowl, range of sizes	Tableware (eating/ drinking)
Splayed rims	High	Bowl	Tableware (eating?)
Plates	Medium	Plate	Tableware (eating?)
Push-up bases	High	All	All
Applied pad base	Low	?	?
Applied ring base	Low	?	?
Folded ring base	Medium	Goblet, lamp?	Tableware (drinking), lighting
Solid ring base	Low	Goblet, lamp?	Tableware (drinking), lighting
Flat disc base	Low	?	?
Angular base	Low	Beaker/Bowl?	Tableware
Flat to rounded base	High	Beaker/Bowl, range of sizes	Tableware (eating/ drinking)
Internally-knobbed base	Medium	Beaker/Bowl?	Tableware
Internally-stepped base	Medium	Beaker/Bowl?	Tableware
Pontil pad	Low	?	?

FIG. 3.94. SUMMARY OF THE INTEGRITY OF THE TYPES AND THEIR PREDICTED FORMS AND FUNCTIONS

Chapter Four
The Glass from Kuwait

Chapter Four turns to consider the glass assemblage from Kuwait, collected by the Kadhima Project during 2009-15. This corpus of material is in fact composed of several assemblages from a number of sites within Kuwait, distributed across four different study regions according to which this chapter is organised. These consist of the 'Kadhima' region, home to several small sites known as Area ABC, Area E, Area F and Area G; the 'Natural Reserve & Mudira' region, which contains the small settlement of Mudira and a walled enclosure known as the Fort; the 'Subiyah' region, home to the expansive settlement of Mughaira and a series of pottery scatters termed torpedo jar sites; and the 'Wadi al-Batin' region, a large wadi channel where one finds the sites of Bahra Hushan and Shiqaya, among several others. All of these sites are related chronologically, yet represent different scales of activity as well as socio-economic contexts. This chapter begins with an introduction to Early Islamic Kuwait and proceeds to explore the glass assemblages from each site, each section ending with a summary of the findings from that area. The results of this research, and their comparison with Unguja Ukuu, are discussed extensively in Chapter Six.

4.1. Introduction to Early Islamic Kuwait

4.1.1. Geography

Modern Kuwait is located at the head of the Persian Gulf, sandwiched between Iraq, Saudi Arabia and the sea (Fig. 4.1). According to received geographical divisions, Kuwait lies at the point where Eastern Arabia meets Mesopotamia. The entirety of the country can be considered arid desert from the interior to the coast and boasts no rivers or lakes, though significant supplies of ground water exist in certain locations. The sites with which we are concerned are all located in the northern half of the country, the geography of which is divisible into three parts: the coastal plain, the desert interior, and the Wadi al-Batin.

The coastal plain is home to the 'Kadhima', 'Natural Reserve & Mudira' and 'Subiyah' study regions and their respective sites (Fig. 4.1). The plain is relatively well defined in topographic terms, being bounded to the interior by a steep cliff, the *Jal al-Zawr*, and on the seaward side by salty coastal flats or *sebkha*. As such it is never more than a few kilometres wide. This narrow, well-defined plain extends north from the city of *al-Jahra* to the *Ras al-Subiyah* peninsula - a distance of just under 60 kilometres. Although barren most of the year, the late winter season sees a brief explosion of scrub-like vegetation. This stretch of coastline is known to have possessed reasonable quantities of sweet groundwater (Kennet *et al.* 2011: 163; al-Duwish 2005: 13).

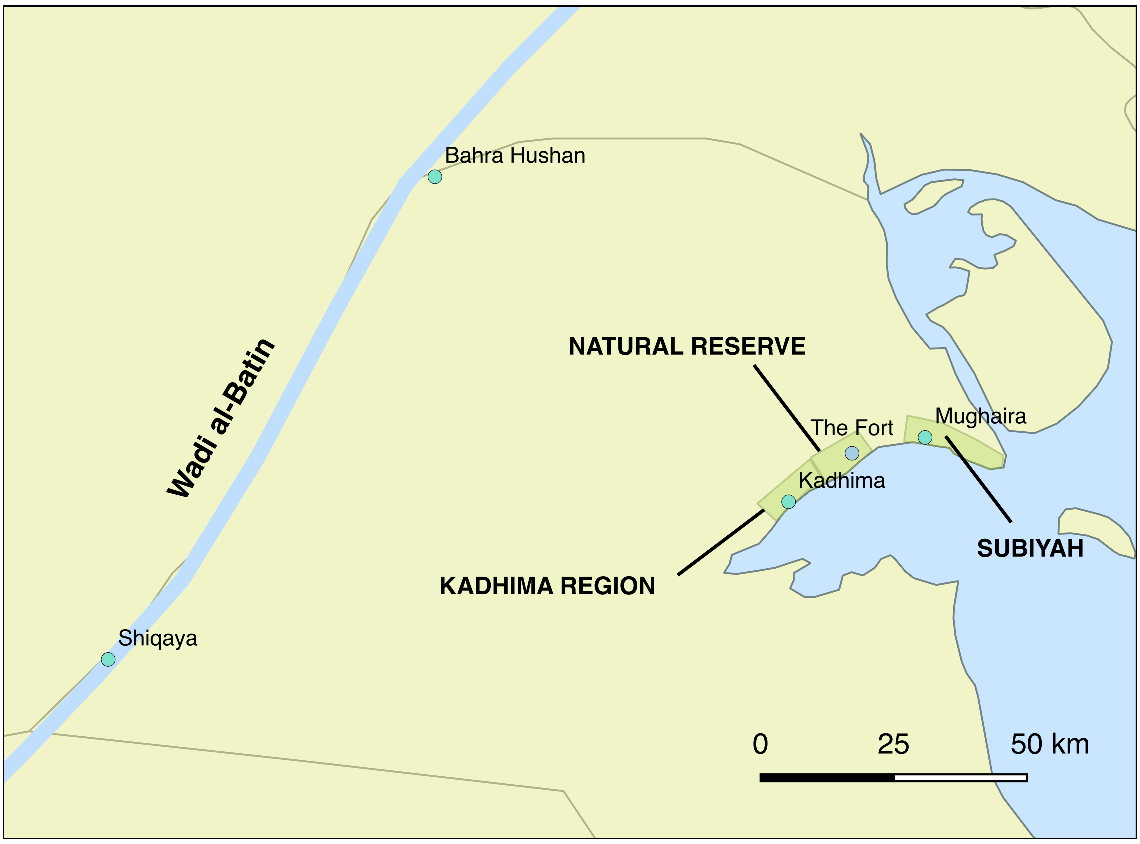


FIG. 4.1. MAP SHOWING THE MAIN KUWAITI SITES

The desert interior consists of a raised plateau which offers a homogenous landscape of barren gravel desert, heavily deflated in nature, and which continues more or less uninterrupted into Saudi Arabia and Iraq. None of the study regions or sites explored within this thesis are found in this environment. The Wadi al-Batin, home to the eponymous study region, is one of the few topographic features which punctuates the desert (Fig. 4.1). This ancient drainage system today forms much of the Kuwait-Iraq border, before continuing into Saudi Arabia. By virtue of its drainage-basin, the wadi concentrates comparatively accessible reserves of sweet groundwater - a fact that has been frequently exploited throughout history. Furthermore, the wadi has long served as a major route way, linking southern Mesopotamia with western Saudi Arabia. In one such manifestation during the Early Islamic period, the wadi was used by pilgrims and other travellers journeying from Basra to the Hijaz, and in many respects might be considered similar to its more famous counterpart, the Darb Zubaydah (Blair & Ulrich

2013). Today the wadi functions as a demilitarised zone between Kuwait and Iraq, and was the scene of intense fighting during the 1991 Gulf War.

4.1.2. Historical significance

For long periods Kuwait appears to have lain dormant, with the archaeological landscape bearing few traces of any substantial occupation. At times, however, this equilibrium appears to have been punctuated by bursts of activity, seemingly arising out of nowhere, and often short-lived. On the mainland, several 'Ubaid settlements of the 6th-5th millennium BC and a range of stone burial mounds dating to the Bronze Age represent pretty much the sum total of traceable activity clearly datable prior to the hellenistic period (Carter 2006; Carter & Crawford 2010), with the latter represented on Akkaz and Umm al-Namil Islands (Gachet 1998, 2011). That is not to say that Kuwait was not otherwise occupied, indeed it is likely that nomadic Bedouin tribes crossed its landscapes throughout much of history up to the modern era. The nearby island of Failaka, over which Kuwait exercises sovereignty, appears to have been more regularly occupied, with substantial Bronze Age and Hellenistic settlement more substantial than that seen on the mainland. The Early Islamic period is one such time when Kuwait became a hive of activity. Archaeological evidence from al-Qusur on Failaka Island and Akkaz Island Reefs attests to the presence of Nestorian ecclesiastic communities and related settlements (Bernard & Salles 1991; Gachet 2011). As the Kadhima Project has now shown and this thesis will later discuss, these were accompanied by several contemporary settlements dotted along the northern Kuwait Bay coastline of the mainland, as well as further inland in the Wadi al-Batin region.

Before proceeding with an overview of the archaeological work, it is worth considering a number of possible historical references to some of the sites which are considered in this chapter. The most famous toponym associated with Early Islamic Kuwait is that of *Kazima*, first appearing in the 9th century AD but claimed by those authors to have a greater antiquity. In a practical sense, this toponym and its derivatives have long been associated with the northern coastline of Kuwait Bay, today surviving in relation to a specific section of that coast as referenced by the 'Kadhima' study area. Before associating the historical toponym with the archaeological remains found within (that is, Areas ABC, E, F and G), it is worth noting that Ulrich has suggested that historical *Kazima* was variously applied to both a general region of Kuwait and a specific settlement therein - but that the precise location of these is never well defined (Ulrich 2012). As such *Kazima* could just as easily apply to the whole of the Kuwait Bay region or beyond, or indeed any of the specific settlements identified within this area.

Otherwise, several medieval geographic texts make reference to communication roads passing through Kuwait, some of which are said to have been in use during the Early Islamic period contemporary with the occupation of historical *Kazima*, both along the coast and through the Wadi al-Batin (Blair & Ulrich 2013: 45-6, 48-9). In regard to the latter, some of the sites mentioned in this thesis may be recorded in such texts, with Shiqaya convincing paired with *al-Shijaya* and Bahra Hushan with *al-Hufayr* (Ulrich 2012: 403; al-Ghunaym 1998: 91, 130).

4.1.3. Previous research

In the last two decades, this historical evidence has been supplemented with an increasing awareness of the extent of Early Islamic archaeological remains. Survey work by Sultan al-Duwish in the modern Kadhima region on the northern coastline of Kuwait Bay identified modest architectural remains visible at surface level along with material culture dating to the Early Islamic period (al-Duwish 2005). Further along the coast to the northeast, a survey of the Subiyah region revealed a series of buildings broadly contemporary with the Kadhima finds (Carter *et al.* 1999; Carter & Crawford 2001; Carter & Crawford 2010). Altogether, archaeological evidence for an Early Islamic period occupation of northern Kuwait was starting to mount up. The problem was that much of this evidence was known only anecdotally, while that which was published was done so locally, in Arabic, or briefly, within wider surveys focussed on earlier chronological activity. As such, work was needed to assess the known evidence and to bring everything together in a holistic study of the Early Islamic period.

4.1.4. The Kadhima Project

With this in mind the Kadhima Project was established in 2009, with the aim of exploring, recording and preserving the Early Islamic archaeology of northern Kuwait, starting with the remains identified at modern Kadhima (hence the project title) by Sultan al-Duwish. The project was funded by the National Council for Culture Arts and Letters and conducted jointly by Durham University (Dr. Derek Kennet) and the Kuwait National Museum (Shehab. A. Shehab).

4.1.4.1. Research aims

The main research objectives involved charting the extent and chronology of the known archaeological remains, searching for further evidence of Early Islamic occupation, and understanding this period of Kuwait's history within its wider spatial and historical context. The need for an extensive programme of research and heritage recording was especially pressing owing to the increasing pace of destruction of Kuwait's natural and archaeological landscapes in the early 21st century AD. A plethora of new roads, pipelines, and even plans for an entire city meant that large swathes of northern Kuwait Bay were at substantial risk.

4.1.4.2. Fieldwork

The fieldwork of the Kadhima Project took place annually, beginning in the winter of 2009 and concluding with a final study season in the summer of 2015. Outlines of the interim results can be found in several publications (Kennet *et al*. 2011; Blair *et al*. 2012; Blair & Ulrich 2013), as well as unpublished reports specific to each field season available from the Kuwait National Museum (see Kadhima Project Reports 2010, 2011, 2012, 2013 and 2014). Altogether the Kadhima Project excavated a total of 53 trenches as well as conducting various surveys in the region of northern Kuwait. A detailed description of this fieldwork is available in Appendix A, with the relevant sections indicated throughout (e.g., §A.1.1). The following sections present a brief overview of the archaeological work conducted in each of the regions explored by the Kadhima Project, followed by an outline of the glass and an interpretative discussion of its significance.

4.2. The Kadhima Region

Fieldwork in the 'Kadhima' study region was focussed on a series of small settlements, Areas ABC, Area E and Area F, a cemetery, Area G; and the wider landscape in which these sites were located (Fig. 4.1).

4.2.1. The Kadhima Landscape Survey

4.2.1.1. The archaeology

The Kadhima landscape was explored through a field-walking survey, aimed at the identification of new sites or and artefact collections (§A.1.1). Transects have been recorded using a 'TR' number and sites with an 'LC' number. This survey demonstrated a low level of off-site activity, both in the form of material culture, ephemeral structures and shell middens. Based on that material which can be dated, almost all of this activity was either contemporary with the main settlements or dated to the pre-modern/modern period.

4.2.1.2. The glass

A total of 41 fragments of glass (90.59 g., 10940 mm^2) were collected during the transect survey of the Kadhima study area. For the most part this amounted to single or pairs of fragments from individual transects (Fig. 4.2). The two exceptions are TR21-8 and TR22-12, from where 10 and 13 fragments were recovered respectively. Transect TR21-8 is located at the north of the Kadhima study region in the vicinity of Area F, which we have shown to be a much larger site than the fenced area initially suggested, and as such this cluster of finds is not unexpected. Indeed nine of the fragments from this transect have been associated with structural features recorded as LC14, LC15 and LC19, and now considered part of the settlement of Area F. TR22-12, meanwhile, was located in the central part of the survey area, not too distant from Area ABC. The glass here was found within a relatively dense scatter of material culture, mostly ceramic, recorded as LC46. As such the distribution of glass in the transect survey indicates that while there is a general spread of glass across the wider landscape, the only real concentrations of glass are in the vicinity of the known Early Islamic settlements.

TRANSECT	No. Fragments	Weight (g.)	Surface Area (mm^2)
TR20-4	1	3	550
TR21-8	10	12.2	1615
TR22-12	13	26.5	3075
TR22-13	1	4.9	400
TR23-1	1	1.8	150
TR23-10	1	2.2	250
TR23-6	1	0.8	175
TR23-7	1	1.9	250
TR23-8	1	4	475
TR24-22	1	1.4	275
TR24-23	1	3.6	575
TR24-24	1	6.7	575
TR30-1	2	3.6	450
TR103	2	10.2	975
TR104	2	3.9	600
UNSTRATIFIED	1	1.79	275
TOTAL	**41**	**90.59**	**10940**

FIG. 4.2. QUANTITY OF GLASS FROM THE TRANSECT SURVEY

Figure 4.3 shows those finds which can be associated with specific features (e.g. LC7). Some of these associations are possibly coincidental or dis-contemporaneous with the Early Islamic activity in the area, such as the fragment from LC7 associated with a recent but pre-modern hearth, or that from LC157, a natural bedrock outcrop. Others, such as LC46, 62 and 76 are associated with larger scatters of material culture, mainly ceramics. The fragments from LC104 and 152 relate to shell exploitation activity - though it is not clear whether the use glass itself can be associated with such activities. Just LC14, 15 and 19 reveal finds of glass in association with structures dated to the Early Islamic period, in this case proximal to the settlement at Area F.

	No. Fragments	Diagnostics	LC Interpretation	LC Date
LC7	1	-	Hearth	Pre-modern
LC14	2	Edge of push-up	Structure	Early Islamic
LC15	1	-	Structure	Early Islamic
LC19	6	Flaring neck (straight); Inwards-folded rim; Edge of push-up	Structure	Early Islamic
LC46	13	Flaring neck (straight); Triangular-beaked rim; Push-up 3, 4 and edge	Artefact scatter	Early Islamic; Modern
LC62	1	-	Artefact scatter	Early Islamic
LC76	1	Edge of push-up	Artefact scatter	Early Islamic
LC104	1	Push-up 4	Shell scatter	?
LC152	1	Ridged shoulder	Shell scatter	Early Islamic
LC157	1	Edge of push-up	Natural feature	N/A

FIG. 4.3. GLASS FROM THE KADHIMA LANDSCAPE SURVEY BY 'LC' SITE

In terms of the make-up of the transect survey assemblage, a total of 24 fragments (50.69 g., 6550 mm^2) consist of undiagnostic body sherds, 58.54% of the total by count. Just six fragments (12.5 g., 1315 mm^2) belong to rim and neck parts, or 14.63%. Finally, there are 11 base fragments (27.4 g., 3075 mm^2) in the transect survey assemblage, or 26.83% of the total count.

Regarding the necks and rims, four fragments belong to closed vessel forms (8.3 g., 840 mm2) while just two belong to open forms (4.2 g., 475 mm2). The closed types consist of two fragments with a *flaring neck (straight)* profile (1.6 g., 265 mm2), one found in TR21-8/LC19, the other in TR22-12/LC46; a bottle with a ridged shoulder (1.8 g., 175 mm2), found in TR30-1/LC152; and one of a *modern* type (4.9 g., 400 mm2), found in TR22-13 (Fig. 4.4). The open types consist of an *inwards-folded rim* from TR21-8/LC19 and a *triangular-beaked rim* from TR22-12/LC46. All the rims represent a vessel each, giving a total of six (Fig. 4.5).

CLOSED	No. Fragments	No. Vessels	Find-spot
Flaring necks (straight)	2	2	LC19 (1); LC46 (1)
Ridged shoulder	1	1	LC152 (1)
Modern form	1	1	TR22-13 (1)
Total	**4**	**4**	**-**

FIG. 4.4. CLOSED VESSELS FROM THE KADHIMA LANDSCAPE SURVEY

OPEN	No. Fragments	No. Vessels	Find-spot
Inwards-folded rim	1	1	LC19
Triangular-beaked rim	1	1	LC46
Total	**2**	**2**	**-**

FIG. 4.5. OPEN VESSELS FROM THE KADHIMA LANDSCAPE SURVEY

BASES	No. Fragments	Find-spot
Push-up 1		
Push-up 3	1	LC46 (1)
Push-up 4	3	LC104 (1); LC46 (2)
Edge of Push-up	5	LC14 (1); LC19 (1); LC157 (1); LC76 (1); LC46 (1)
Folded ring base	1	TR21-8 (1)
Modern	1	TR103 (1)
Total		

FIG. 4.6. BASES FROM THE KADHIMA LANDSCAPE SURVEY

Nine of the base fragments belong to push-up bases (17.6 g., 2275 mm^2), five of which are classed as *edge of push-ups* (6.1 g., 925 mm^2), two of which were found in TR21-8/ LC14 and LC19, with one each in TR30-1/LC157, TR23-11/LC76 and TR22-12/LC46 (Fig. 4.6). Of the three push-ups recorded as size *type 4* (8 g., 1000 mm^2), one was found in TR24-22/LC104, with the remaining two in TR22-12/LC46. The single fragment recorded as size *type 3* (3.5 g., 350 mm^2) was also found in TR22-12/LC46. The remaining base fragments consist of a single *folded ring base* (3.2 g., 275 mm^2), found in TR21-8, and a single *modern moulded* fragment (6.6 g., 525 mm^2), found in TR103.

Just two of the fragments possess any decoration, with both examples exhibiting the *dimpled* technique. These fragments were found in TR22-12/LC46 and TR30-1/LC152 respectively. In terms of colour groups, 22 fragments belong to LGB glass, with three TQ, two CL and one BL (Fig. 4.7). Six fragments are of EG glass, and seven considered Modern. Being surface finds, there is a reasonable chance that some of the EG fragments are also modern in date. That said, for the most part the metals seem to fit with the general appearance of Early Islamic glass.

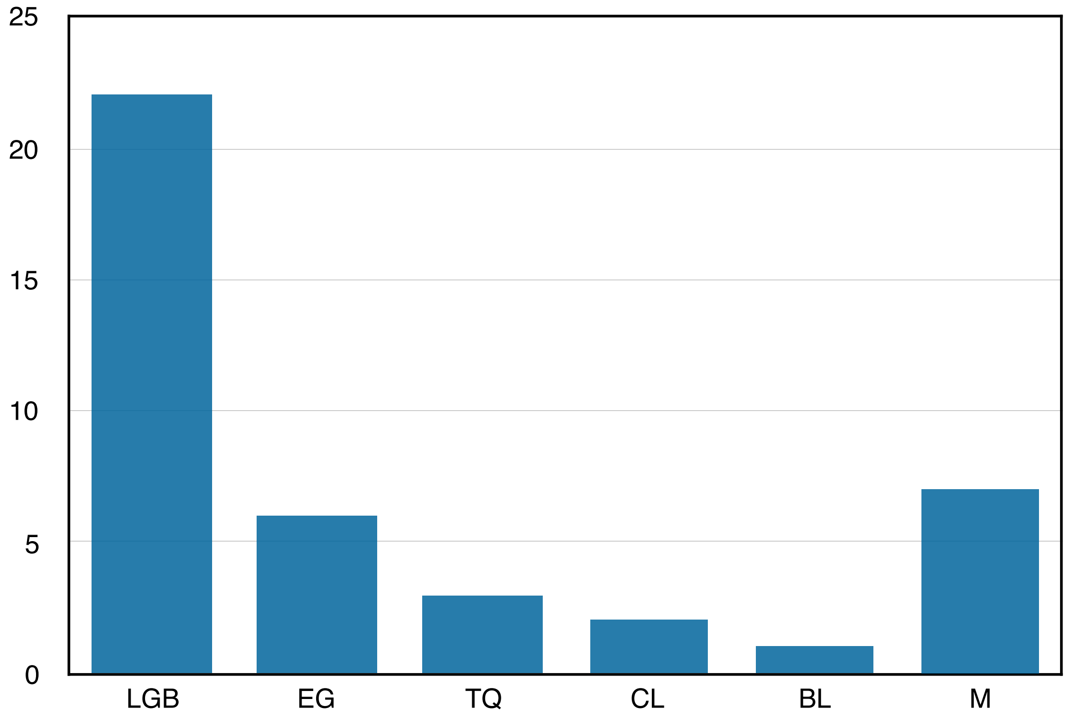


FIG. 4.7. COLOUR GROUPS FROM THE KADHIMA LANDSCAPE SURVEY

4.2.1.3. Interpreting the results from the Kadhima landscape

Regarding the distribution of the glass, while the results show a general spread of glass present across the wider 'Kadhima' landscape, the only real concentrations of glass are in the vicinity of the known Early Islamic settlements (particularly Areas ABC and E). This is seen in both the general distribution of the glass according to transection, and when the LC sites are considered. Overall, the distribution of pottery is much wider and more intensive than with glass. While this is partly due to the fact that a greater quantity of pottery was used at the nearby sites, it is reasonable to suggest that pottery as a material may have been more likely to be taken 'off-site', while glass remained closely tied to the immediate settlements. Some of the LC sites which produced glass, such as the shell middens, suggest a use-context that seems unusual. That said, while some of these associations will undoubtedly be coincidental (as the discovery of glass in association with a feature which later turned out to be natural bedrock shows), it is possible that glass was being used at a more diverse range of sites than is generally appreciated. Regarding the role played by glass, the six vessels identified from the Transect Survey assemblage have been seen to include four closed and two open forms. However, owing to the dispersed origins of this material it is not worth reading much into this pattern. It is impossible to talk of a 'role' for glass in relation to such an arbitrary area, whereas the results from the LC sites are too small to warrant much discussion, and indeed lack diagnostics.

4.2.2. Area ABC

4.2.2.1.The archaeology

Area ABC (Fig. 4.8) was explored through a surface survey, artefact collections from designated 'pick-up' areas (e.g. PU 1) and nine separate excavations (see §A.1.2; EX27, EX28, EX29, EX30, EX31, EX39, EX40, EX41 and EX42). This work demonstrated a dense collection of artefacts and ecofacts (particularly pottery, glass and shell) in association with some structures. The main structure (explored by EX27) was revealed to consist of a three-roomed mudbrick building (c. 8 x 5 m), superimposed upon an earlier timber-framed structure, and with evidence of considerable extramural activity in an outer 'courtyard' as well as some smaller 'satellite' structures. This was accompanied by a substantial stone-lined well and cistern complex (see EX28). It appears that the well complex was designed to facilitate the watering of multiple pack-animals; while the building may have been related to the administration of the well and its resources. The ceramic evidence suggests a late-7th to 8th century AD occupation, although the well may have continued to be used after the building's abandonment. The other trenches explored ephemeral features and empty spaces between the well and mud-brick building. A total of 663 fragments (637.36 g., 97090 mm^2) of glass were recovered from Area ABC, with this quantity originating from both the survey (332 fr., 279.02 g., 37225 mm^2) and excavations (331 fr., 358.34 g., 59865 mm^2).

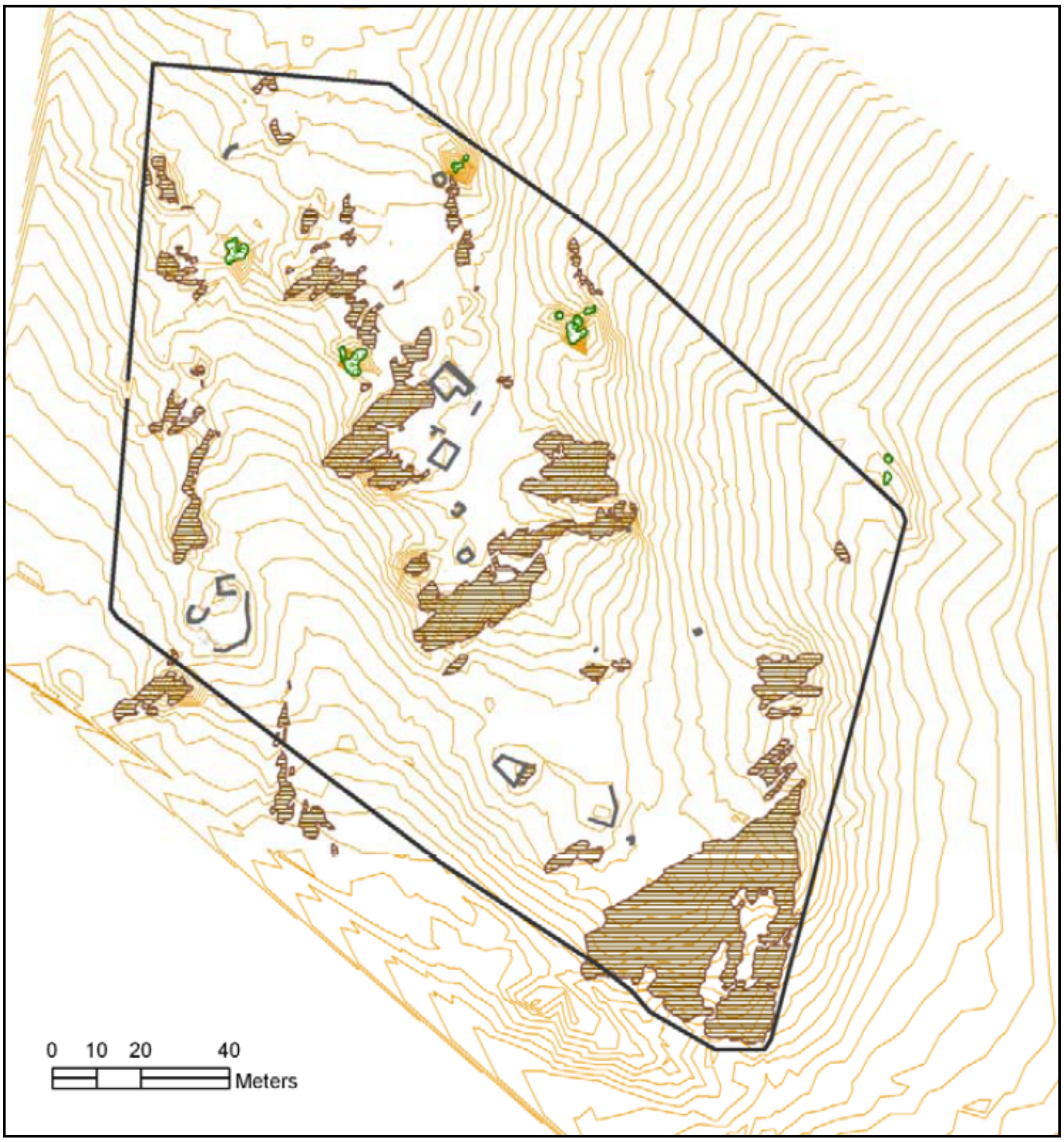


FIG. 4.8. PLAN OF AREA ABC

4.2.2.2. Glass from the site survey

The scatter plot for Area ABC reveal a distribution pattern strongly associated with the outcropping bedrock ridge and the archaeological features which line it, with particular concentrations in the area of the large building (Fig. 4.9). There is comparatively little material either side of the ridge, including in the area of the well and cistern complex. This must reflect past activity foci to some degree, but could also partly result from differential processes of erosion and sedimentation - the raised bedrock ridge being more prone to erosion and thus exposure of buried material than the surrounding areas. The distribution of glass seems to agree with that of the other recorded finds, including glazed and unglazed pottery and shell.

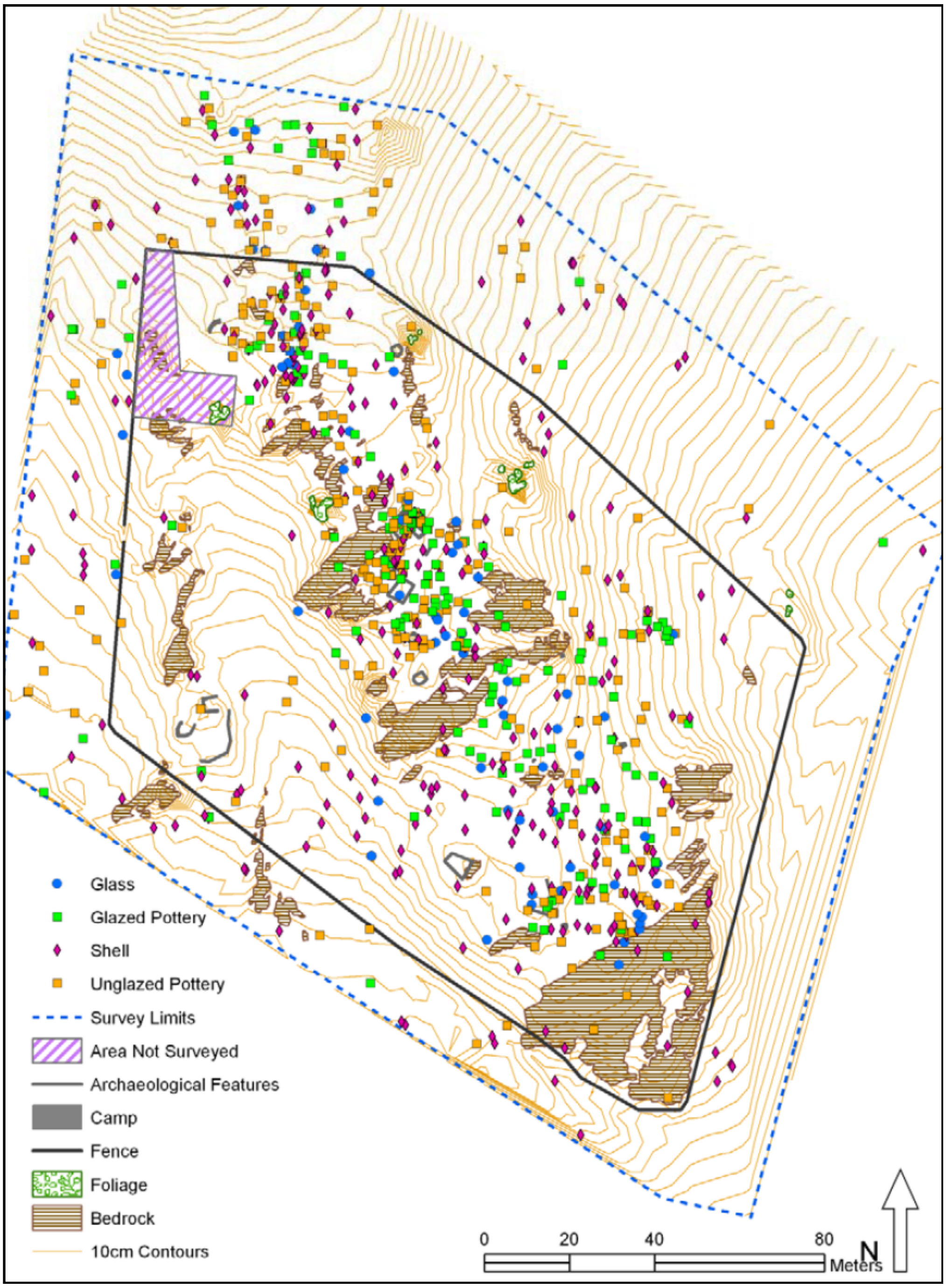


FIG. 4.9. ARTEFACT SCATTER PLOT OF AREA ABC

A total of 285 fragments (238.17 g., 30925 mm^2) were collected from the nine pick-up areas (Fig. 4.10). On average, this gives an average density of 0.08 fragments per m^2 (0.06 g./m^2, 8.18 mm^2/m^2). In terms of the individual areas, ABC PU 2, located over structural remains in the central part of the site, shows by far the most dense distribution of glass (0.50 fr./m^2, 0.35 g./m^2, 43.58 mm^2/m^2). This is followed by ABC PU 3 and 4, both of which are clustered nearby in the central hollow of the ridge, also in the immediate vicinity of the large building. PUs 1, 5 and 6 show similar densities of glass, not quite reaching the above peaks but indicating substantial activity at either end of the bedrock outcrop. PUs 7, 8 and 9, all located slightly outside the fenced area, show a continuation of the spread of glass but with a greatly reduced density. This drop-off may reflect the reduced protection afforded outside the fenced area, but also likely supports the general impression that one is moving away from the centre of glass-associated activity during the Early Islamic occupation.

This pattern appears to mirror the distribution density of pottery, relatively speaking, though ceramic material is more numerous. One slight discrepancy, which may prove of importance in understanding the different role played by these objects in the material life of the site, is that pottery distribution seems to be more dense immediately around the large building than over the building itself (i.e., in PU 3 and PU 4 rather than in PU 2), whereas glass reveals the opposite pattern. This suggests we might consider glass as a commodity confined in use to the interior of the buildings, rather than extramural activity areas. A small quantity of the survey glass (47 fr., 40.85 g., 6300 mm2) was recorded simply as from Area ABC, with no further locational information.

Pick-up Zone	Glass fr.	fr./m^2	g./m^2	mm^2/m^2	Pottery fr.	Pottery fr./m^2
ABC PU 1	71	0.11	0.12	13.06	188	0.30
ABC PU 2	66	0.50	0.35	43.58	134	1.02
ABC PU 3	12	0.18	0.16	21.25	100	1.49
ABC PU 4	25	0.17	0.11	18.21	168	1.15
ABC PU 5	12	0.11	0.10	13.83	87	0.78
ABC PU 6	75	0.08	0.06	8.58	109	0.12
ABC PU 7	8	0.01	0.00	0.69	12	0.01
ABC PU 8	6	0.02	0.02	2.65	23	0.07
ABC PU 9	10	0.03	0.05	5.14	72	0.21
TOTAL	**285**	**0.08**	**0.06**	**8.18**	**893**	**0.24**

FIG. 4.10. GLASS AND POTTERY ‘PICK-UP’ RESULTS FOR AREA ABC

A total of 81.63% of the glass from the Area ABC Survey consist of undiagnostic body fragments (271 fr., 153.94g., 25350 mm^2), followed by 9.64% rim and neck fragments (32 fr., 35.46 g., 4850 mm^2), 8.13% base fragments (27 fr., 61.41 g., 6300 mm^2) and 0.60% miscellaneous fragments (2 fr., 28.21 g., 725 mm^2). Eleven of the rim and neck fragments belong to 'closed' vessel forms, compared with 20 'open' forms and just one 'semi-open' form. The closed vessel types consist of three *folded and flattened rims* from ABC PUs 1, 7 and 9, each from a different vessel (Fig. 4.11). These are joined by three *flaring necks (rolled-in rims)* from ABC PUs 1, 2 and 4, again each representing a different vessel, and one *flaring neck (straight)* from ABC PU 1. The closed types are completed by a single fragment of neck *type C* from ABC PU 9, and three fragments of neck *type A*, one from ABC PU 3 and two joining examples from ABC PU 6. The single semi-open vessel consists of a *trailed rim* found in ABC PU 9.

CLOSED	No. Fragments	No. Vessels	Find-spot
Folded and flattened rims	3	3	PU 1, 7 and 9
Flaring necks (rolled-in rims)	3	3	PU 1, 2 and 4
Flaring neck (straight)	1	1	PU 1
Neck type A	3	2	PU 3 and 6
Neck type C	1	1	PU 9
Trailed rim	1	1	PU 9
Total	**12**	**11**	**-**

FIG. 4.11. CLOSED VESSELS FROM THE AREA ABC SURVEY

The open fragments, proportionally more numerous here than in the excavations, can be broken down into five types (Fig. 4.12). Most common are *inwards-folded rims* with six fragments, each representing a different vessel, one of which was found in ABC PU 1, three in PU 2 and one in PU 6. *Triangular-beaked rims* are also represented by six fragments, however two of these belong to the same vessel giving a total vessel count of five. Two of these fragments were found in ABC PU 1, one in PU 3, and three in PU 4. The fragments from the same original vessel were found across PU 1 and PU 4, showing that the surface deposits have moved around somewhat. The remaining open types include four fragments with *stepped rims*, each representing a different vessel, with one from ABC PUs 1, 5 and 6, and the other's find-spot unrecorded. Three fragments have *plain rims (thick)*, each from a distinct vessel, with the find-spot recorded for just one fragment as ABC PU 6. Finally, a single fragment belongs to an open vessel with a *rolled-in rim*, recorded as from ABC PU 2.

OPEN	No. Fragments	No. Vessels	Find-spot
Inwards-folded rims	6	6	PU 1, 3 and 6
Triangular-beaked rims	6	5	PU 1, 3 and 4
Stepped rims	4	4	PU 1, 5 and 6
Plain rims (thick)	3	3	PU 6
Rolled-in rim	1	1	PU 2
Total	**20**	**19**	**-**

FIG. 4.12. OPEN VESSELS FROM THE AREA ABC SURVEY

Of the bases (Fig. 4.13), all but two of the 27 fragments represent 'push-up' forms. Seventeen of these are *edge of push-ups,* with five from ABC PU 1, three from PU 2, three from PU 5, one from PU 6, two from PU 8, and the rest unrecorded. The measured push-ups include a single fragment of *type 1* from ABC PU 1; three of *type 2*, with one from PU 6 and the others unrecorded; one of *type 3* from PU 1; two of *type 4*, with one each from ABC PU 6 and PU 8; and one of *type L* from ABC PU 9. The remaining base types are both *applied ring-bases*, with one from ABC PU 6 and the other find-spot unrecorded.

BASES	No. Fragments	Find-spot
Push-up 1	1	PU 1
Push-up 2	3	PU 6
Push-up 3	1	PU 1
Push-up 4	2	PU 6 and 8
Push-up L	1	PU 9
Edge of Push-up	17	PU 1, 2, 5, 6 and 8
Applied ring-bases	2	PU 6
Total	**27**	**-**

FIG. 4.13. BASE FRAGMENTS FROM THE AREA ABC SURVEY

The ‘miscellaneous’ fragments consist of one rough *chunk* of glass found in Area ABC PU 1, and a fragment of an *applied trail* of unknown find-spot, possibly used originally to decorate a vessel (Fig. 4.14). In addition to this trail and the trailed rim fragment described above, just one other fragment possesses any form of decoration. This consists of a mould-blown *dimpled* body fragment, possibly the shoulder part of a closed vessel, found in ABC PU 4.

MISC.	No. Fragments	Find-spot
Chunk	1	PU 1
Applied trail	1	-
Total	**2**	**-**

FIG. 4.14. MISCELLANEOUS FRAGMENTS FROM THE AREA ABC SURVEY

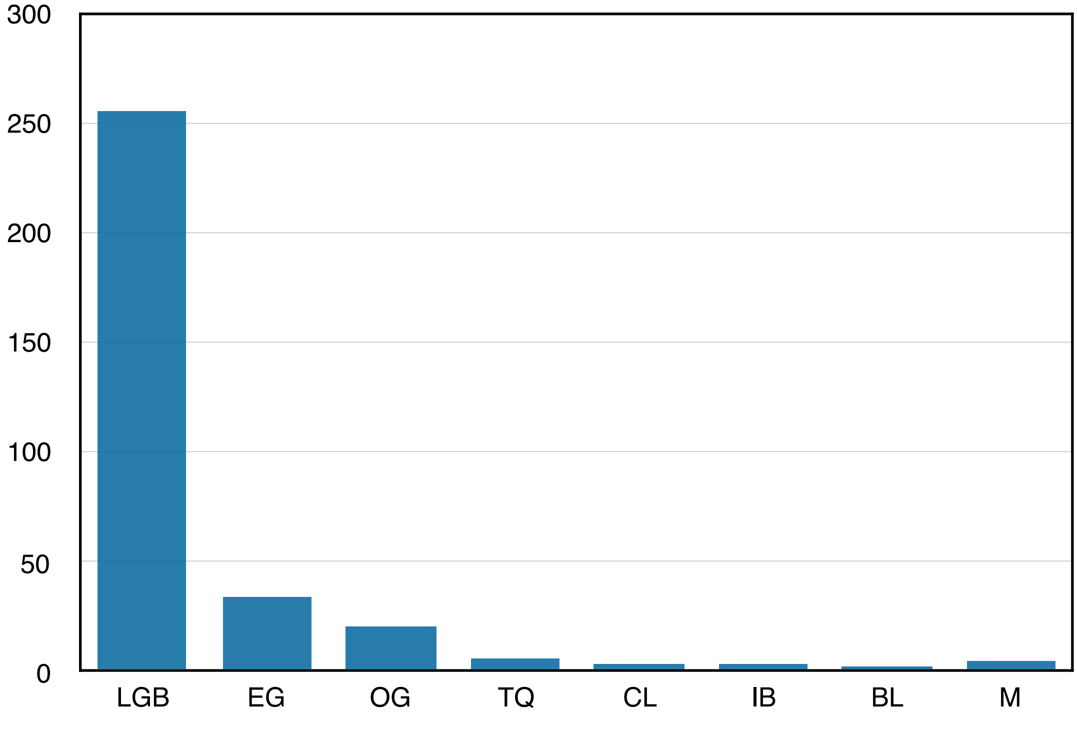


FIG. 4.15. COLOUR GROUPS FROM THE AREA ABC SURVEY

Metal-wise (Fig. 4.15), just one fragment is completely obscured by a weathering crust making identification of colour relatively straight-forward. LGB glass makes up 77.34% of the total (256 fr., 131.76 g., 23300 mm^2), followed by the potentially-modern EG glass with 10.27% (34 fr., 76.18 g., 5650 mm^2). The remaining groups are barely represented. OG glass forms just 6.04% (20 fr., 29.55 g., 3425 mm^2) of the ABC Survey assemblage, with even smaller quantities of TQ with 1.81% (6 fr., 8.82 g., 1150 mm²), CL with 1.21% (4 fr., 11.6 g., 1350 mm²), IB with 1.21% (4 fr., 2.01 g., 300 mm²), and BL with 0.60% (2 fr., 4 g., 575 mm²). Just 1.51% has been identified as definitely modern material (5 fr., 14.5 g., 1375 mm²), though much of the EG glass may well fall into this category also.

FIG. 4.16. THE LARGE BUILDING AT AREA ABC. THE SOUTH ROOM IS SHOWN AT THE BOTTOM RIGHT, THE NORTH ROOM AT THE BOTTOM LEFT, AND THE EAST ROOM AT THE TOP LEFT.

4.2.2.3. Glass from the excavations

The Area ABC excavations produced 331 fragments of glass (358.34 g., 59865 mm²). This should be analysed according to that from the mud-brick building (EX27), that from the well complex (EX28), and that from the minor trenches in between.

The mud-brick building (EX27)

A total of 275 fragments of glass (288.48 g., 49915 mm²) emerged from trench EX27, and can thus be associated with the large building within Area ABC (Fig. 4.16). Of these (Fig. 4.17), 12 fragments (5.65 g., 1325 mm²) can be associated with the pre-building contexts across the trench, with four fragments found in the pit/post-hole combination (335/296)(319/336), and the remainder in the general deposits (322/333/337/359/413).

MUD-BRICK BUILDING	Count	Weight (g.)	Surface Area (mm^2)
Pre-building	12	5.65	1325
North room	58	69.34	11140
South room	13	8.04	1925
East room	60	65.42	16280
Courtyard	107	123.58	16760
Surface	25	-	-
Total	**275**	**288.48**	**49915**

FIG. 4.17. QUANTITY OF GLASS FROM THE EXCAVATIONS AT AREA ABC

The north room, the first part of the building to be erected, produced 58 fragments (69.34 g., 11140 mm^2) of glass. Four of these (1.42 g., 425 mm^2) were found during the excavation of the walls (253) and (265). The majority, 52 fragments (67.44 g., 10565 mm2) were found in the intramural fill associated with the room's occupation (256) and (380). The remaining two were found in association with a clay plinth feature (331) and as fill of a pit (321) which cut through part of the room's occupation layers (410) into the pre-building phase below (333).

The south room, meanwhile, produced 13 fragments (8.04 g., 1935 mm^2). Six of these belonged to the later or post-abandonment deposits associated with the room, including windblown sand (261) and wall collapse (351). Another six fragments (6.12 g., 1375 mm^2) were recovered from the main intramural deposit (294). The final fragment came from the fill of a hearth (293).

The east room, added later, produced 60 fragments of glass (65.42 g., 16280 mm^2). The majority of these, 32 fragments (44.47 g., 11685 mm^2), originated in the late intramural deposit (255), with a sizeable quantity (20 fr., 18.45 g., 3820 mm^2) associated with the underlying floor-level (295). Smaller quantities were found in the lower deposits of the east room, with three fragments in (313), two in (310) and two in (307). A single fragment was recovered from the sandy deposit (356) beneath the stone feature (350).

The extra-mural courtyard produced a total of 107 fragments of glass (123.58 g., 16760 mm^2). A sizeable quantity of this material (39 fr., 30.97 g., 5450 mm^2) was recovered from the upper post-abandonment layer (254). That said, 50 fragments (76.83 g., 9135 mm^2) belong to deposits more closely associated with the use of the courtyard (349=446), possibly even predating some of the main building though the relationship is hard to ascertain. Other deposits which produced glass include (272) with eight fragments, and (357) with three fragments. A number of fragments were found in association with more definite features, including a single fragment from a earthen working surface (346), three from a cobbled surface (400), one from posthole (487) and two from the posthole (489). The remaining 25 fragments were excavated from the upper windblown sand (251) which stretched across the entire trench.

The vast majority of the glass from EX27, 205 fragments, are body sherds (102.61 g., 23415 mm^2), with 40 base fragments (105.05 g., 14525 mm^2), and 30 rim/neck fragments (80.82 g., 11975 mm^2). As usual, most of the body fragments of are undiagnostic of form. However, 22 fragments (8.54 g., 3135 mm^2) belong to a single open vessel with a *plain - fine* rim.

Open	**No. Fragments**	**No. Vessels**	**Find-spot**
Plain rims (fine)	7	2	East room (1); Courtyard (1)
Stepped rims	4	4	Pre-building (1); Courtyard (3)
Inwards-folded rims	2	2	Surface (2)
Triangular-beaked rim	1	1	Surface (1)
Plain rim (thick)	1	1	Courtyard (1)
Total	**15**	**10**	**-**

FIG. 4.18. OPEN VESSELS FROM THE MUD-BRICK BUILDING EXCAVATIONS (EX27) AT AREA ABC

Open forms make up 50% of the rim assemblage by count with 15 fragments (Fig. 4.18). Seven of these have been identified as *plain rims (fine)*, all but one of which originate from the same vessel as the body fragments described above. This thus gives a total of two vessels with *plain rims (fine)* associated with the large building, divided into a total of 29 fragments once body and base fragments are included. The vessel represented by just one fragment is slightly larger in size, and was recovered from the courtyard deposit (254). The more intact vessel, represented by 28 fragments, was however found within the confines of the east room, in deposit (255). The remaining open forms include four fragments from vessels with *stepped rims*, each representing a unique vessel. One of these is associated with the pre-building deposit (322), with the remaining three all from different areas of the courtyard including (254), (349) and (400). A single example of the related *triangular-beaked rim* type was recovered from the general surface deposit (251). The remaining open rim types consist of two fragments with *inwards-folded rims*, both of which are from the same surface deposit (251) but represent different vessels giving a total of two. Finally, a fragment with a a *plain rim (thick)* from the courtyard (254) completes the open vessel types. Altogether, therefore, the rim fragments suggest a total of 10 individual open vessels associated with the large building.

CLOSED	No. Fragments	No. Vessels	Find-spot
Flaring necks (straight)	4	3	North room (1); Courtyard (1); Surface (1)
Folded and flattened rims	3	3	North room (1); Courtyard (2)
Ribbed necks (narrow)	2	2	North room (1); Courtyard (1)
Neck type A	1	1	North room (1)
Neck type B	2	2	North room (1)
Neck type C	2	2	North room (1); Courtyard (1)
Flaring neck (bevelled rim)	1	1	Courtyard (1)
Total	**15**	**14**	**-**

FIG. 4.19. CLOSED VESSELS FROM THE MUD-BRICK BUILDING EXCAVATIONS (EX27) AT AREA ABC

The corresponding closed and semi-open forms, of which there are 15 fragments, can be divided into six types (Fig. 4.19). Vessels with *flaring necks (straight)* are most common with four fragments, representing three individual vessels, with one from the general windblown surface (251), one from the courtyard (254), and the other from the fill of the north room (256). Three fragments belong to *folded and flattened rims*, representing a total of three individual vessels, with two from the courtyard deposits (254) and (446), and one from the north room (256). Two fragments of vessels with *ribbed necks (narrow)*, each of which belongs to a different original vessel, were excavated from the north room (256) and the courtyard (254). To this we can add several partially diagnostic neck fragments. A single neck of *type A* was found in the north room (256), along with two neck *type B* (256). One neck *type C* was also found in the north room (256), with a second fragment found in the courtyard (254). Altogether, including the neck fragments, this suggests a total of 13 individual closed vessels associated with the large building at Area ABC. A single semi-open vessel with a *flaring neck (bevelled rim)* was found in the courtyard (254).

The 40 base fragments associated with the large building almost all belong to push-up bases, though range over a wide variety of size categories (Fig. 4.20). Partial *edge of push-up* fragments are of course most common with 15 fragments, with two distributed in the pre-building deposits (333/413), eight in the courtyard (254/272/349/400/446/489), four in the north room (256) and one in the south room (261). A single fragment of size *type 1* was found in the courtyard (349). Six fragments belong to size *type 2*, with one of these found in the north room (256) and the remaining five in the courtyard (446). The seven fragments of *type 3* are distributed between the north room (256/380) with four, the south room (294) with two, and the courtyard with one (254). Of the two fragments of size *type 4*, one is found in the general surface deposit (251), with the other in the courtyard (349). Three fragments belong to *type 5*, with one found in the north room (256), one in the east room (295) and one in the courtyard (254). Finally, regarding the four fragments of *type 6*, three are found in the east room (255), with the remaining one in the north room (256). Those of *type 6* from the east room can be associated with the near intact open vessel with *plain - fine* rim responsible for the large quantity of body and rim fragments discussed above. Just two fragments belong to forms than push-up base types. One of these is extremely unusual, consisting of an *internally-knobbed* base found in the courtyard (446). The other belongs to an *applied pad base*, found in the north room (256).

BASES	No. Fragments	Find-spot
Push-up 1	1	Courtyard (1)
Push-up 2	6	North room (1); Courtyard (5)
Push-up 3	7	North room (4); South room (2); Courtyard (1)
Push-up 4	2	Courtyard (1); Surface (1)
Push-up 5	3	North room (1); East room (1); Courtyard (1)
Push-up 6	4	North room (1); East room (3)
Edge of Push-up	15	Pre-building (2); North room (4); South room (1); Courtyard (8)
Internally-knobbed base	1	Courtyard (1)
Applied pad base	1	North room (1)
Total	**40**	**-**

FIG. 4.20. BASE FRAGMENTS FROM THE MUD-BRICK BUILDING (EX27)

A total of 34 fragments from the large building possess some form of decoration. We have already discussed the *internally-knobbed* base, the central boss having been applied. Otherwise, a *flaring neck (straight)* fragment from the north room is decorated with a thin band of blue colouration running around the rim circumference. The vast majority of the decorated fragments, with 31 in total, exhibit dimpled decoration having been mould-blown. All of these belong to the same individual vessel, that found in the east room (255) with the *plain rim (fine)* and push-up base *type 6*.

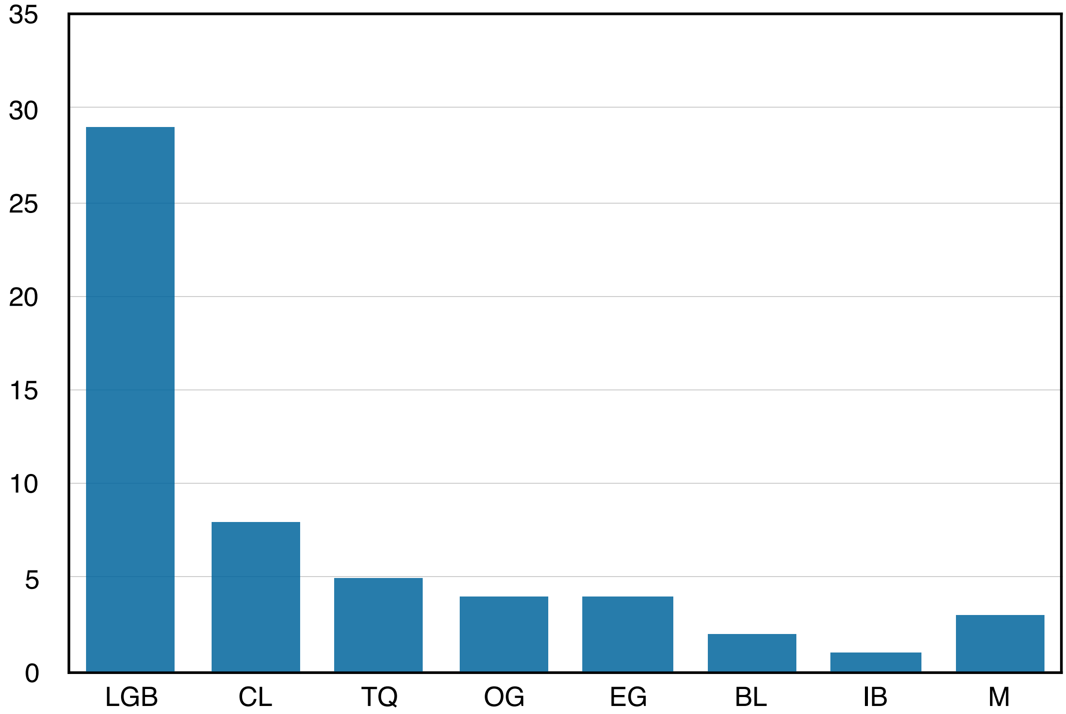


FIG. 4.21. COLOUR GROUPS FROM THE MUD-BRICK BUILDING (EX27)

In terms of metal and colour groups (Fig. 4.21), most of the glass from the large building is corroded (212 fr., 250.44 g., 43250 mm^2). For those fragments where colour is possible to identify, LGB glass is most common (29 fr., 9.14 g., 1980 mm^2), followed by CL (8 fr., 4.61 g., 1175 mm^2), TQ (5 fr., 5.41 g., 700 mm^2), OG (4 fr., 6.25 g., 1235 mm2), EG (4 fr., 6.2 g., 525 mm^2), BL (2 fr., 1.62 g., 300 mm^2), IB (1 fr., 0.37 g., 100 mm2) and modern metals (3 fr., 2.73 g., 325 mm^2).

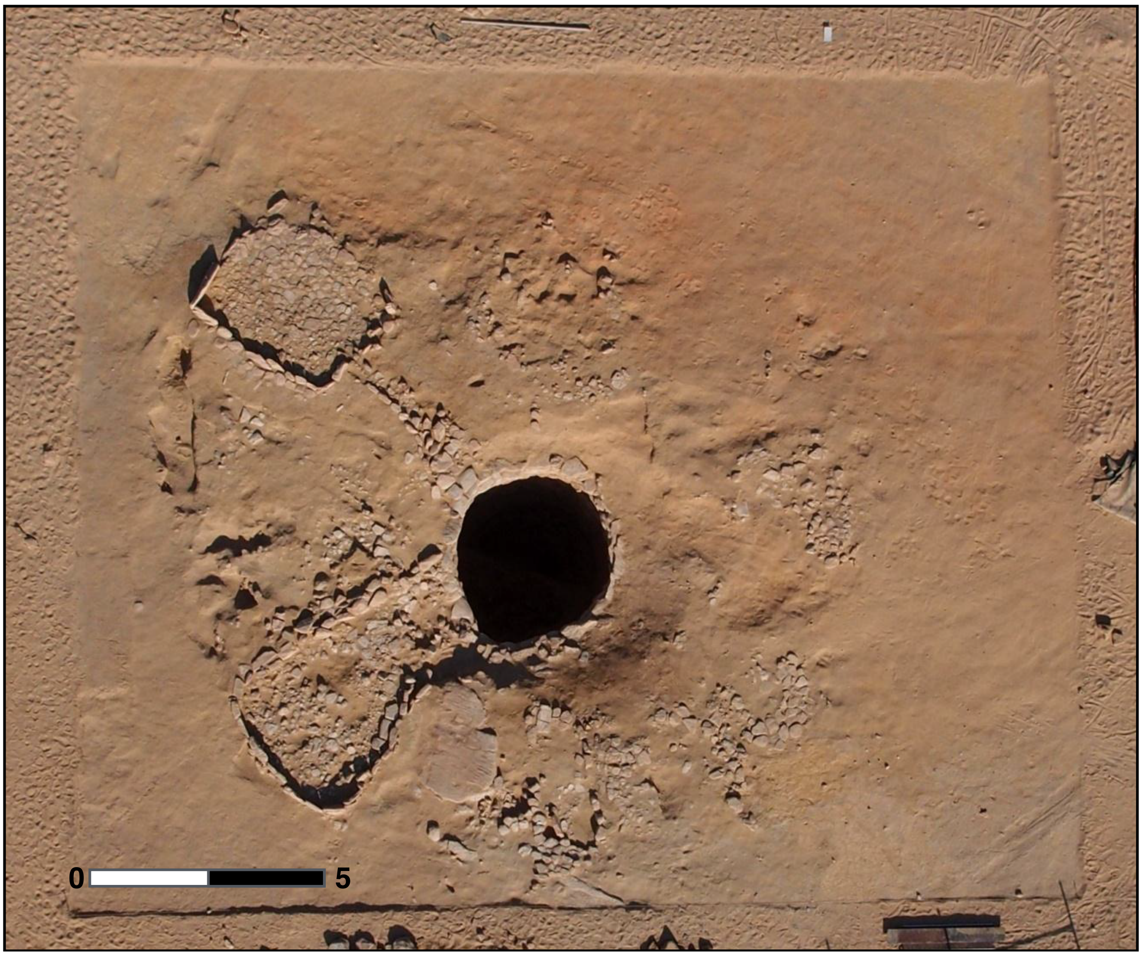


FIG. 4.22. THE WELL AND SURVIVING CISTERNS (EX28)

The well and cistern complex (EX28)

A total of 42 fragments (51.27 g., 7525 mm^2) of glass were found in the course of the excavation of the well complex, that is, EX28 (Fig. 4.22). Of these, five fragments (12.04 g., 1425 mm^2) can be associated with contexts related to the construction and use of the well (Fig. 4.23). These include the single fragment (0.08 g., 50 mm^2) found in association with the upcast from the excavation of the well shaft (300), the fragment (8.02 g., 775 mm^2) found in relation to a deposit of hardened clay which was part of the working area associated with the cisterns (341), the fragment (0.35 g., 100 mm^2) found in association with cistern 28.2 (464), and the two fragments (3.59 g., 500 mm^2) associated with cistern 28.6 (304)/(354). Following this initial phase, two fragments (7.22 g., 850 mm^2) were associated with contexts relating to the rearrangement of the architecture of the complex (301)/(302), albeit separated from the initial use by an unknown period of time. Finally, 35 fragments (32.01 g., 5250 mm^2) were recovered from the windblown sand deposits which cover the trench, including (252), (289) and (291). Interestingly, no glass was recovered from the fill of the well shaft (285).

WELL COMPLEX	Count	Weight (g.)	Surface Area (mm^2)
Well construction and use	5	12.04	1425
Re-use	2	7.22	850
Surface	35	32.01	5250
Total	**42**	**51.27**	**7525**

FIG. 4.23. QUANTITY OF GLASS FROM THE WELL COMPLEX (EX28) AT AREA ABC

The majority of the fragments, 54.76% by count (23 fr., 10.08 g., 2175 mm^2), consist of undiagnostic body sherds, followed by base fragments with 28.57% (12 fr., 27.85 g., 3475 mm^2), and rim and neck fragments with 16.67% (7 fr., 13.34 g., 18.75 mm^2). Weight and surface area measurements suggest much larger proportions of base and rim fragments, with weight placing base fragments on 54.32%, rim and neck fragments on 26.02%, and body fragments on just 19.66%. However, it must be remembered that these more body parts are thicker (and therefore heavier) and more robust, meaning they survive in larger chunks.

The seven rim and neck fragments consist of three closed vessel forms, three open vessel forms and one semi-open vessel. Each of the closed and semi-open fragments exhibits a different rim type and thus represents an individual vessel, giving a total of four (Fig. 4.24). One type is similar to those found in association with the large building, a *neck type A*, found in the windblown surface sand, (289) and (291) respectively. The remaining two types include a *flaring neck (rolled-in rim)* and a *ribbed neck (wide)* again both found in the surface context (289). This later type is different to the *ribbed necks* found elsewhere in that, while the same scoring technique is involved, the resulting vessel boasts a much wider neck. The semi-open vessel consists of a *flaring neck (bevelled rim),* found in the windblown surface sand, (289).

CLOSED	No. Fragments	No. Vessels	Find-spot
Flaring neck (rolled-in rim)	1	1	Surface
Ribbed neck (wide)	1	1	Surface
Neck type A	1	1	Surface
Flaring neck (bevelled rim)	1	1	Surface
Total	**4**	**4**	**-**

FIG. 4.24. CLOSED VESSELS FROM THE WELL (EX28) AT AREA ABC

The three open vessel fragments belong to three distinct types, giving a total vessel count of three (Fig. 4.25). Two of these, the *plain rim (thick)* and the *rolled-in rim* were found in the windblown surface context (289), while the *stepped rim* was found in association with a context contemporary with the rearrangement or secondary use of the cistern complex (301).

Open	No. Fragments	No. Vessels	Find-spot
Plain rim (thick)	1	1	Surface
Rolled-in rim	1	1	Surface
Stepped rim	1	1	Reuse
Total	**3**	**3**	**-**

FIG. 4.25. OPEN VESSELS FROM THE WELL (EX28) AT AREA ABC

Regarding the bases (Fig. 4.26), 11 fragments (19.83 g., 2700 mm^2) belong to push-up forms. Eight of these have been categorised as *edge of push-ups*, of which six were recovered from the surface deposit (289), one from the rearranged area (302), and one from a context associated with cistern 28.6 (304). One each of the remaining push-up bases fall into size *types 2*, *3* and *4*, each of which was excavated from the usual surface deposit (289). The final base fragment, an *internally-stepped base*, is unique at the site and generally rare. Here it is found in the hardened clay (341) associated with the primary construction and use of the cisterns.

BASES	No. Fragments	Find-spot
Push-up 2	1	Surface (1)
Push-up 3	1	Surface (1)
Push-up 4	1	Surface (1)
Edge of Push-up	8	Use (1); Reuse (1); Surface (6)
Internally-stepped base	1	Use (1)
Total	**11**	**-**

FIG. 4.26. BASE FRAGMENTS FROM THE WELL (EX28) AT AREA ABC

This *internally-stepped* fragment also reveals two decorative techniques. The step itself was either formed by the *application* of a thick trail around the interior circumference of the base, or by a complex process of *folding*. Either way, the traces of this particular piece of working have been erased by the subsequent finishing. Secondly, the internal centre of the base possesses a circular recess which has been *ground* or *relief cut*, an altogether more involved and time-consuming technique. None of the other fragments exhibit any traces of decoration. In terms of metal, the vast majority of the fragments (35 fr.) are badly weathered, precluding the secure identification of colour. That said, many of these weathered fragments (21 perhaps) seem to represent basic LGB glass, with one possibly of TQ glass. Where metal is less obscured, TQ glass is indeed most common with three fragments (1.36 g., 275 mm^2), with single examples of CL, OG and M colours. The M (modern) fragment was found in the upper windblown layer (252), with the remainder of the identifiable metals found in another surface windblown deposit (289).

Minor excavations at Area ABC

A total of 14 fragments remain from the other excavations in Area ABC, which explored the surface deposits of ephemeral features and 'empty' areas between the mud-brick building and well complex (Fig. 4.27). Contextual information for one of these (K-GL1257) has unfortunately been lost, though this fragment consists of an *edge of push-up* base type.

ABC OTHER	**Count**	**Weight (g.)**	**Surface Area (mm2)**
EX31	9	8.75	1350
EX40	1	5.18	475
EX42	3	4.32	525

FIG. 4.27. QUANTITY OF GLASS FROM THE MINOR EXCAVATIONS AT AREA ABC

Nine fragments (8.75 g., 1350 mm^2) were recorded from EX31 (exploring a curvilinear stone wall), all from surface context (490). Seven of these represent undiagnostic body fragments, along with one *triangular-beaked rim* and an *edge of push-up* base. The base exhibits an LGB metal, as does one of the body fragments. Another of the body fragments exhibits an EG glass, quite likely a modern metal. The rest are too weathered for secure categorisation, though most seem to have affinities with the LGB group.

One fragment (5.18 g., 475 mm^2) was excavated from EX40 (the 'T'-shaped stone feature), surface context (497). This fragment belongs to an open vessel with an *inwards-folded rim*, and was produced in LGB glass. Finally, three fragments were recovered from EX42 (the square stone feature), with two from surface context (495) and one from surface context (602). One of the fragments from (495) consists of a body sherd in a rare example of IB glass, with the other an *edge of push-up* base with a distinctive TQ metal. The fragment from (602) represents a push-up *type 2*, though this metal is obscured by weathering crust. None of these fragments possess any trace of decoration.

4.2.2.4. Interpreting the results from Area ABC

For Area ABC, glass is clearly most strongly associated with the large building and the bedrock ridge upon which it sits. It is worth noting that the excavations beneath the large mud-brick building revealed a small quantity of glass in association with what appears to have been an earlier timber development. Glass was also found outside the building in the proposed 'courtyard area'. While it would be a mistake to consider all the glass as having been found in its original use-context, this at least warrants speculation that glass was being used immediately outside of the mud-brick structure. The lower number of vessels associated with the well complex is not surprising, owing to the fact that this is not a habitation or structural context. In fact, why any glass should be found in association with the well at all is not certain. Visions of cups or bottles being filled directly from the bucket or cistern are probably fanciful, with glass probably not the best vessel choice for use in such a rough-and-ready working environment. Accidental breakage from loaded caravans is another option, but the most likely explanation is that the glass represents general discard from the main building.

What then of the total number of vessels present at Area ABC? The majority of the 63 vessels calculated for Area ABC were likely accumulated by the inhabitants of the large building, perhaps with a small amount discarded by non-resident frequenters of the well. Aside from a few ephemeral structural features and an extension of the 'courtyard' area, it is likely that much of the glass producing contexts have been excavated within Area ABC. As a speculative exercise, if the figure of 11 vessels excavated from the courtyard (not including the survey data) is doubled, this would give a hypothetical total of just 74 vessels. The point here is to demonstrate that the more reliable figure of 63 vessels postulated above already gives a good estimate of the total quantity of glass in Area ABC. Should there have been another large building or two, this would change, but this does not seem to have been the case.

Some insight into the role of glass at Area ABC was made possible through the above consideration of form. Regarding the 63 vessels estimated for Area ABC, these break down into 29 closed/semi-open and 34 open vessel forms. The number of open vessels requires some discussion, as this will be seen to contrast the dominance of closed forms across the Kadhima region as a whole. The dominance of open forms at ABC is heavily influenced by the survey material, where open forms number 19 vessels compared to 10 closed vessels and one semi-open vessel. Strangely, this pattern represents a strong contrast not just to the results for the entire Kadhima region, but also to the pattern presented by the excavated material from the large building at Area ABC. This building produced an estimated 24 vessels, with 13 closed forms compared to just 10 open vessel forms and one semi-open vessel. The seven vessels from the well include three closed, three open and one semi-open vessel, while the remaining two vessels from the other trenches are both open forms.

By way of interpretation, the 24 vessels excavated from the large building give the impression that a variety of distinct functional roles could have been fulfilled by glass objects. The 10 open vessels include five different rim types but all seemingly represent small tablewares that one might traditionally associate with the presentation and consumption of food and drink. The fact that these types are not rare nor particularly well-finished seems to indicate that they were there to be used rather than for display - though it is risky to ascribe value judgements to such items. The closed vessels, which make up a majority of the assemblage here, seem to relate to a variety of different functions. Four of the vessels, including the proposed bottle types with *folded and flattened rims* and neck *type A,* are likely practical quotidian items related to the storage of bulk liquid commodities, whatever they may be. As such they might be linked to the less visible aspects of serving and consumption. The two vessels with *ribbed necks (narrow)* almost certainly represent toiletry items, intended as containers for other commodities including but not limited to cosmetics, precious oils and medicines. Harder to interpret are the role of the six vessels with *flaring necks (straight)* and neck *type B*. These vessels could have been used as storage containers or as small flasks for serving, and thus could be considered multifunctional in nature. The larger and more robust semi-open vessel with a *flaring neck (bevelled rim)* probably represents a jar or 'carafe' form of vessel, and is such might be considered among the serving items or tablewares. As such, thinking in practical terms, glass performed a mixed range of functions within the context of the large building. Most of the items could be considered as tablewares (the 10 open vessels), though serving items (the single vessel with a *flaring neck (bevelled rim)* and four *flaring neck (straight)* vessels), domestic storage containers (the three *folded and flattened rims*) and toiletry containers (the two *ribbed necks (narrow)* vessels) were also present.

It is hard to understand why the survey material suggests an even higher quantity of open vessel forms and thus a greater role for glass as a tableware. The open vessels consist of the same types as found in the excavations, just appearing in greater quantity. The closed vessels contain a slightly different assemblage. The *folded and flattened rims* remain, thus fulfilling the storage function, while there is just one example of a *flaring neck (straight)*. These are joined by a type not seen in the excavated material, a *flaring neck (rolled-in rim)*. Such a vessel form, however, probably suited a similar range of functions as the *flaring neck (straight)* vessels, as far as one might comfortably speculate.

The base fragments meanwhile add very little to this discussion of the role of glass. The 'push-up' bases from Area ABC tend to concentrate in the small to mid-size range, *types 2* and *3,* though it is impossible to link these to specific vessel forms. It is worth noting, however, that few very small bases (as one might expect with some toilet items) or very large bases were found in the assemblage. The small number of unusual bases, including the *applied pad*, *applied ring*, *internally stepped* and *internally knobbed* bases, again cannot be easily linked to specific vessel forms. However, the fact that these types are unusual finds in the Early Islamic glass tradition might indicate a small role for some unusual glass objects within the large building at Area ABC. It is possible that rarity might mean that these vessels conveyed a sense of being special, though their scarcity within the Area ABC assemblage makes clear that conveying such an impression was either not an important concern, or that just a few such rare vessels were attainable.

In summary, the typological evidence suggests that glass played a mixed number of roles at Area ABC. The assemblage appears to be a practical one, and while the open forms signify an important involvement in some form of serving, consumption and display, it seems likely that the glass assemblage was not overly 'luxurious' nor intended purely for display. This is supported by the low quantity of decorated vessels identified, not to mention the basic range of decorative techniques employed. In addition, the vast majority of the assemblage, perhaps c. 75%, was produced in a basic, naturally-coloured LGB metal. Deliberately-coloured glass in bright colours exists in very small quantities, making up just a handful of fragments in each case. It is likely that few of the vessels which made up the Area ABC assemblage would have stood out as special pieces. As a final point, the 'miscellaneous' *chunk* from Area ABC might be considered a fragment of raw, unworked glass. As such, it may attest to the transport and exchange of unworked glass, though the fact that just a single fragment of this type was found indicates that this was not a common occurrence in the Kadhima region.

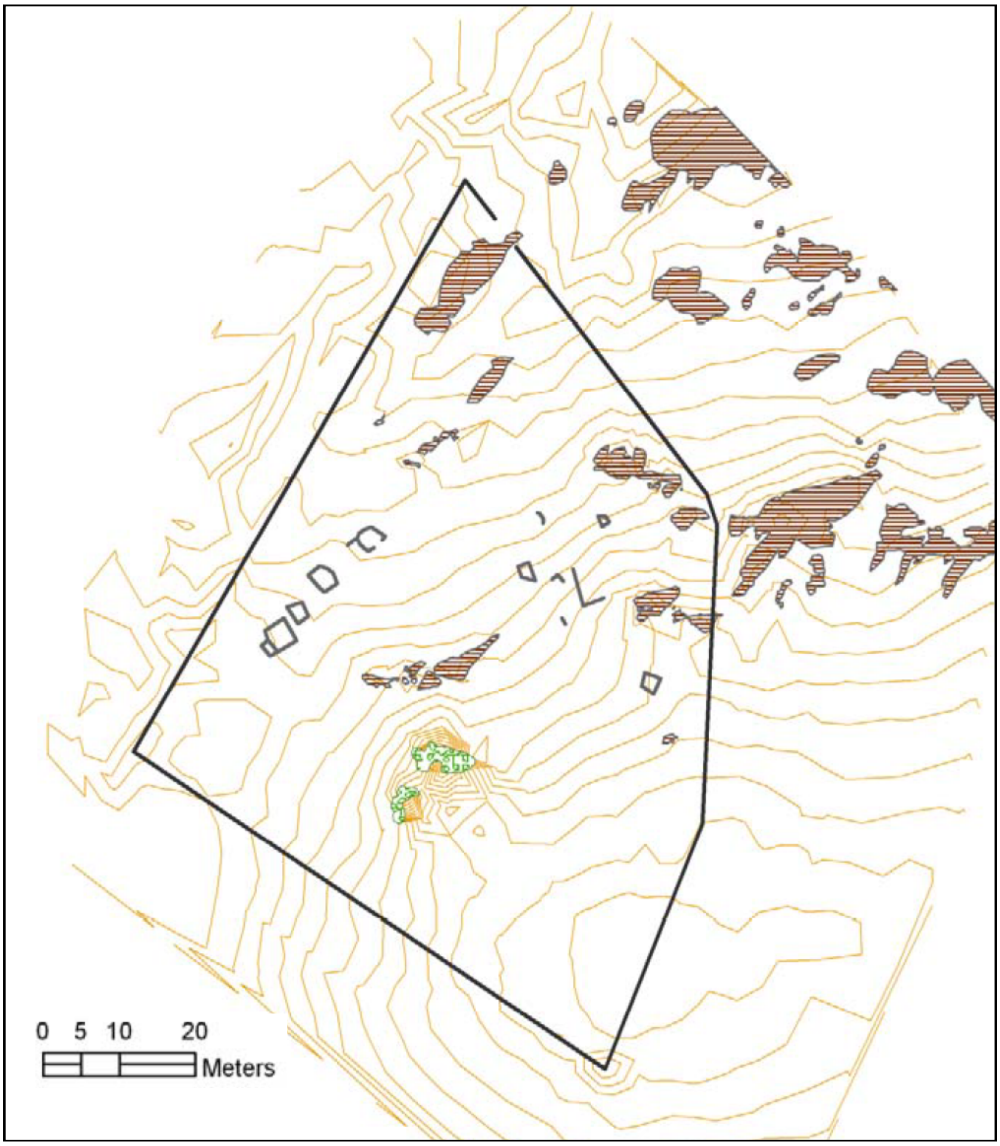


FIG. 4.28. TOPOGRAPHIC PLAN OF AREA E

4.2.3. Area E

4.2.3.1. The archaeology

Area E (Fig. 4.28) was explored using the same survey methodology as Area ABC, along with 12 separate excavations (see §A.1.3.; EX2, EX4, EX5, EX6, EX7, EX8, EX9, EX10, EX12, EX13, EX14, EX15). The most substantial feature of the site is row of eight structures, mostly single-roomed, each defined by several courses of stone foundations (Fig. 4.29). Again the excavations revealed an extensive extramural activity zone or 'courtyard'. The main row was accompanied by several other simple, stone-defined features located in the general vicinity. The ceramic evidence suggests that these structures were contemporary with Area ABC, thus dating to the late-7th to 8th century AD. A total of 658 fragments (318.99 g., 68245 mm^2) of glass were retrieved from Area E. Altogether, 187 (129.44 g., 19,900 mm^2) of these belong to the surface collections undertaken as part of the survey, with 471 fragments (189.55 g., 48345 mm^2) originating from the excavations.

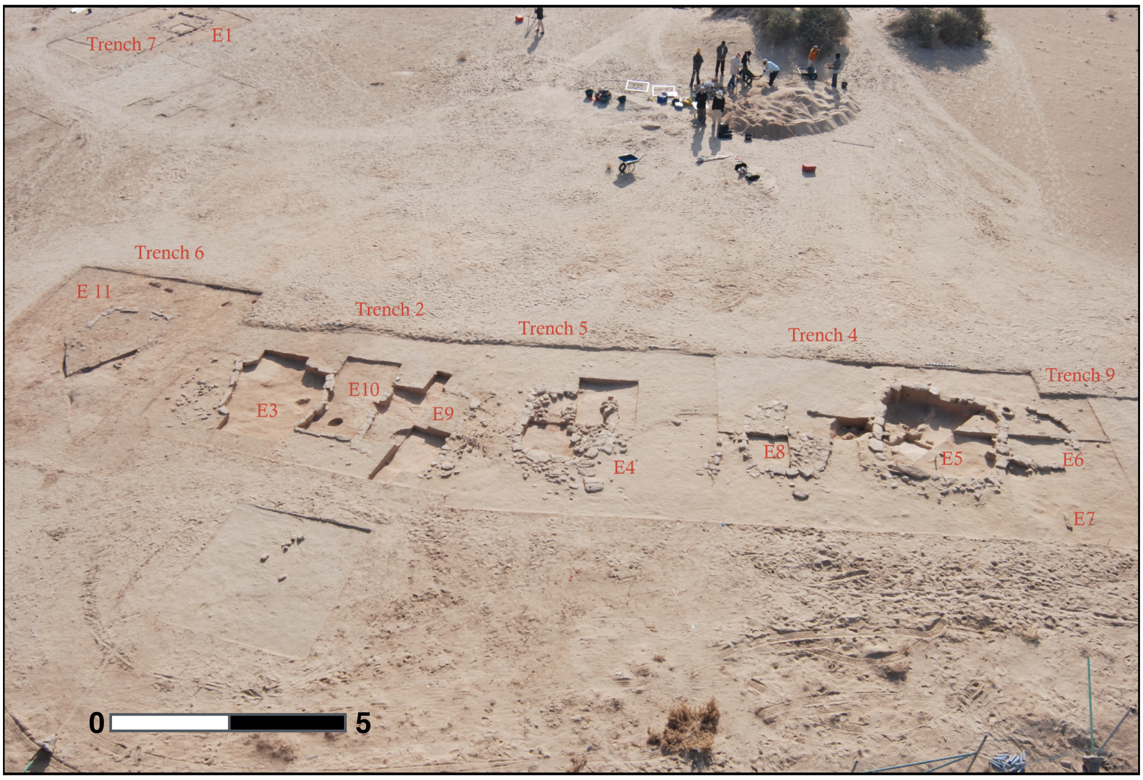


FIG. 4.29. THE 'MAIN ROW' AT AREA E DURING EXCAVATION (PHOTO FACING SE)

4.2.3.2. Glass from the site survey (Area E)

The artefact scatter plots from Area E show a slightly unexpected distribution of surface material (Fig. 4.30). Comparatively little glass, or indeed any material, was located over the main row of buildings (Structures E3, E4, E5/6, E7, E8, E9, E10 and E11), in spite of the fact that these are the best preserved and most dominant architectural remains. Greater distributions are found close to structure E1 and in other areas close to the outcropping bedrock. Indeed, substantial quantities of material of all kinds are found outside the fenced area to the northeast.

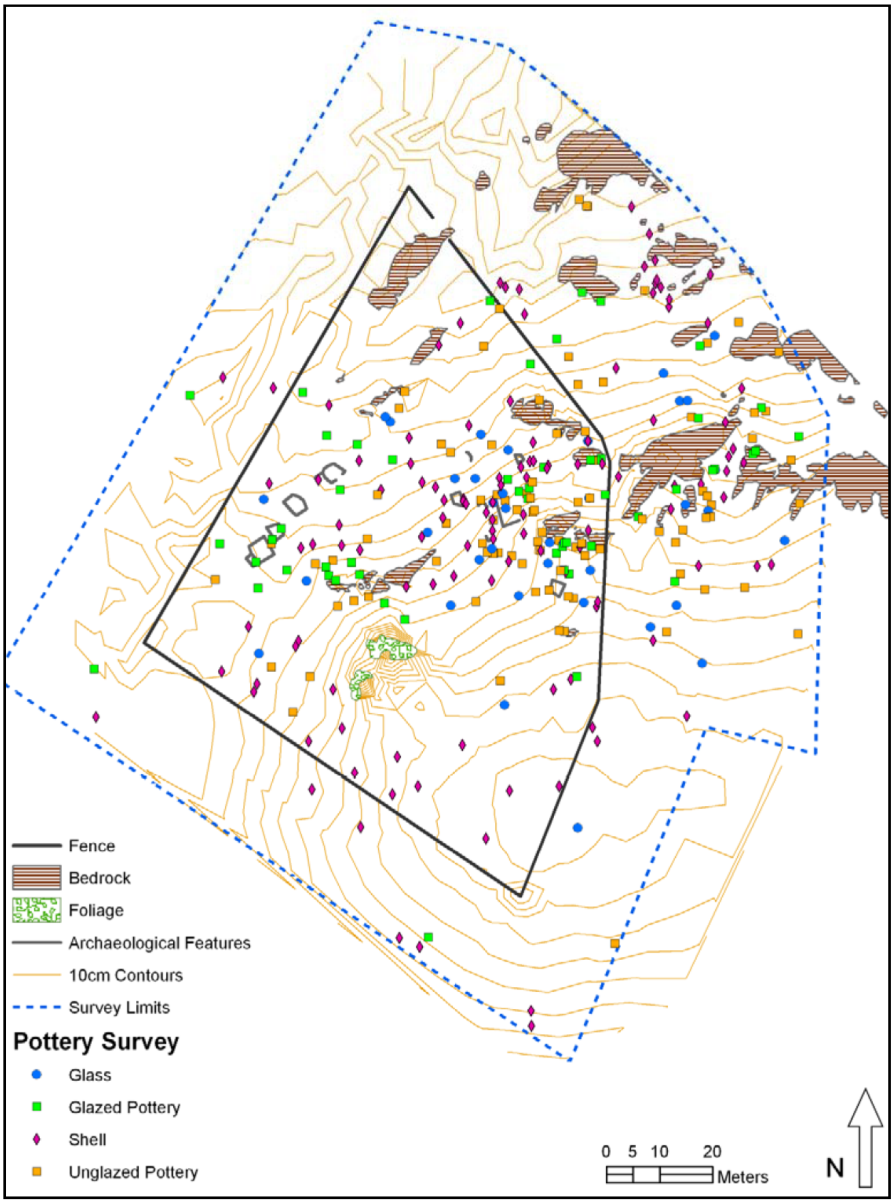


FIG. 4.30. ARTEFACT SCATTER PLOT FOR AREA E

This picture is supported by the results from the nine artefact pick-ups (Fig. 4.31). The pick-up areas located over the main row of buildings, E PUs 2 and 4, possessed relatively low densities of glass, though E PU 3 reveals a slightly higher density. Instead, the bedrock pick-up locations of E PU 1, 6 and 9 stand out dramatically in terms of fragment density. E PUs 5 and 7, although they have reasonable quantities of glass in absolute terms, represent large collection areas, and the density figures are correspondingly small. The fact that the ceramic density results mirror this pattern shows that this situation was not one particular to glass as a material.

Pick-up Zone	Glass fr.	fr./m^2	g./m^2	mm^2/m^2	Pottery fr.	Pottery fr./ m^2
E PU 1	20	0.25	0.10	20.78	38	0.48
E PU 2	1	0.03	0.04	5.18	0	0.00
E PU 3	2	0.10	0.12	17.34	1	0.05
E PU 4	2	0.02	0.01	3.21	9	0.11
E PU 5	17	0.07	0.05	7.43	15	0.06
E PU 6	59	0.38	0.26	40.43	42	0.27
E PU 7	25	0.05	0.02	4.74	48	0.10
E PU 8	6	0.02	0.05	5.33	3	0.01
E PU 9	29	0.20	0.14	22.50	39	0.27
TOTAL	**161**	**0.11**	**0.07**	**11.64**	**195**	**0.13**

FIG. 4.31. GLASS AND POTTERY DENSITIES FOR AREA E

Here we must consider whether this distribution is purely explained by differential processes of erosion, those areas near the bedrock being more exposed. Alternatively, there is the possibility that our impressions about the focus of activity within Area E being on the main row of buildings has been mislead by their better preservation, whereas in fact the main focus was in the areas on and in between the bedrock outcrops - as we believe it was at Area ABC. If we accept that this pattern does indeed reflect past reality, it is possible to argue that the main row of buildings at Area E had a function which did not require or allow for much in the way of material culture. Instead, the main material culture-based activity took place in the area of the bedrock, either ‘off-site’ in uncovered areas or where the associated structures have been badly degraded and even mostly destroyed.

Regarding the typology of the survey glass from Area E, 89.84% by count consist of body fragments (168 fr., 85.1 g., 15550 mm^2), along with 4.81% rims and necks (9 fr., 21.6 g., 2075 mm^2), 3.74% bases (7 fr., 20.94 g., 2100 mm^2), and 1.60% miscellaneous fragments (3 fr., 1.8 g., 175 mm^2). Just one of the rim and neck fragments represents an 'open' form, specifically a vessel with a *plain rim (fine)* from E PU 1 (Fig. 4.32). Seven of the fragments belong to 'closed' forms (Fig. 4.33). Among these are three examples of *folded and flattened rims*, one from E PU 5, with each belonging to a different vessel. These are accompanied by a fragment of neck *type A*, thought to belong to the same kind of vessel as the *folded and flattened rim*. In addition, there are single fragments belonging to 'flaring' neck types, including one *flaring neck (rolled-in rim)* from E PU 5, one *flaring neck (rolled-out rim)* again from E PU 5, and a *flaring neck (straight)* recorded simply as from Area E. The rim and neck categories are completed by a modern fragment with a 'semi-open' form.

OPEN	No. Fragments	No. Vessels	Find-spot
Plain rim (fine)	1	1	PU 1 (1)
Total	**1**	**1**	**-**

FIG. 4.32. OPEN VESSELS FROM THE AREA E SURVEY

CLOSED	No. Fragments	No. Vessels	Find-spot
Folded and flattened rims	3	3	PU 5 (1)
Flaring necks (rolled-in rims)	1	1	PU 5 (1)
Flaring necks (rolled-out rims)	1	1	PU 5 (1)
Flaring necks (straight)	1	1	-
Neck type A	1	1	-
Total	**7**	**7**	**-**

FIG. 4.33. CLOSED VESSELS FROM THE AREA E SURVEY

The seven base fragments consist of a single modern *moulded* base (excluded) and six 'push-up' forms (Fig. 4.34). Four of these consist of *edge of push-ups*, with one from E PU 5, one from E PU 6, and two from E PU 9. These are joined by one fragment of push-up size *type 3* from E PU 8 and one of *type 4* from E PU 3.

BASES	**No. Fragments**	**Find-spot**
Push-up 3	1	PU 8 (1)
Push-up 4	1	PU 3 (1)
Edge of Push-up	4	PU 5 (1), 6 (1) and 9 (2)
Total	**7**	**-**

FIG. 4.34. BASE FRAGMENTS FROM THE AREA E SURVEY

The three miscellaneous fragments include two distinct *applied feet*, one from E PU 6 and the other from E PU 3 (Fig. 4.35). As we shall see below, the foot from E PU 3 (K-GL392) joins two others found during the excavation of the modern surface around the main row of structures (018). The remaining miscellaneous fragment consists of an *applied handle*, for which no precise find-spot was recorded.

MISC	**No. Fragments**	**Find-spot**
Applied feet	2	PU 6 (1) and 3 (1)
Applied handle	1	-
Total	**3**	**-**

FIG. 4.35. MISCELLANEOUS FRAGMENTS FROM THE AREA E SURVEY

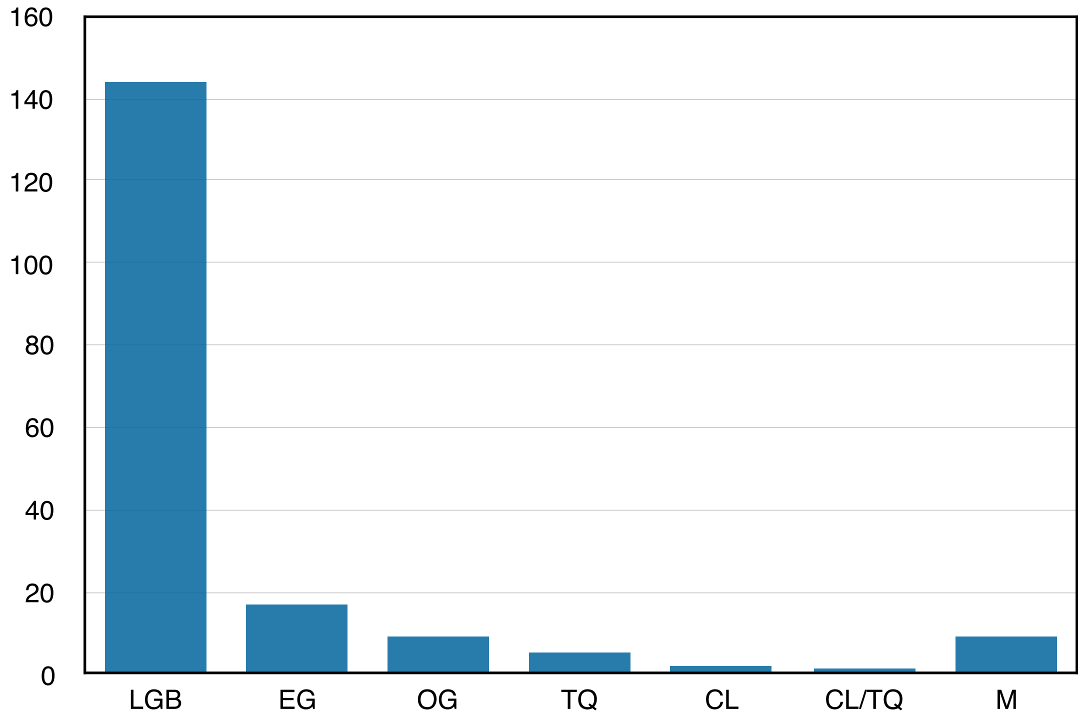


FIG. 4.36. COLOUR GROUPS FROM AREA E SURVEY

Applied fragments aside, no examples of decoration were recorded among the Area E Survey material. In terms of colour (Fig. 4.36), the surface exposure of the fragments has resulted in extensive sand-blasting giving many the smooth appearance of 'sea glass' and with the added advantage (for purposes of colour identification) of having removed any weathering crust. As such, the vast majority of the fragments 77.01%, are of basic LGB glass (144 fr., 64.9 g., 12650 mm^2), followed by 9.09% EG glass (17 fr., 19.9 g., 2575 mm^2) - much of which may be modern. Nine fragments (31.99 g., 2425 mm^2), or 4.81%, are of a definitely modern metal. The remaining colour groups include 4.81% OG glass (9 fr., 6.56 g., 1150 mm^2), 2.67% TQ glass (5 fr., 3.29 g., 650 mm^2), 1.07% CL glass (2 fr., 2.4 g., 400 mm^2), and 0.53% (1 fr. 0.4 g., 50 mm^2) a combination of both CL and TQ glass.

4.2.3.3. Glass from the excavations (Area E)

Regarding the glass from the excavations (Fig. 4.37), almost all the glass was recovered from the excavations of the structures located along the main row. The pre-structural deposits which are found beneath the entire site, and which are interpreted as having formed naturally, contain a small amount of glass with 22 fragments (6.67 g., 2150 mm^2). Most of these, a total of 14 fragments, originated in (118), with three in (098), two each in (072) and (212), and one in (231).

AREA E	Count	Weight (g.)	Surface Area (mm^2)
Main Row:			
Pre-building	22	6.67	2150
E11	6	1.25	550
E3	35	19.8	4300
E10	17	11.1	2275
E9	6	2.63	700
E4	19	6.95	1625
E8	9	2.27	500
E5/6	187	44.5	16270
E7	0	0	0
Courtyard	75	30.17	8725
Surface (Main Row)	41	-	-
OUTLYING STRUCTURES:			
E1	20	7.28	1725
EX8 Surface	0	0	0
EX10 Surface	6	8	575
EX12 Surface	2	1.1	200
EX13 Surface	6	5.24	675
EX14 Surface	0	0	0
EX15 Surface	1	1.29	100
Total	**471**	**189.55**	**48345**

FIG. 4.37. QUANTITY OF GLASS FROM THE EXCAVATIONS AT AREA E

In terms of the buildings of the main row, structure E11 contains six fragments (1.25 g., 550 mm^2), with all of these associated with the possible post-holes or tree root bowls at the structure's corners (099)/(100)/(103)/(215). Structure E3 produced a total of 35 fragments (19.8 g., 4300 mm^2), with 22 of these from intramural surface deposit (010) and the remaining 13 fragments from the packed floor (013). Structure E10 revealed 17 fragments (11.1 g., 2275 mm^2), 16 of which originated from the intramural deposit (017), with the remaining fragment found in the fill of pit or posthole [086]/(081). Structure E9 offered just six fragments (2.63 g., 700 mm^2), with three of these from intramural deposit (211) and another one from the overlying deposit (213). A further fragment was found in the fill (216) of the cut [233] for the wall foundation (016). Structure E4 (and its immediate extramural activity area which extends towards E9) produced 19 fragments of glass (6.95 g., 1625 mm^2). Eight of these were found in the intramural deposit (38), with the remaining 11 found in the extramural area (151)/(198). Structure E8 produced nine fragments (2.27 g., 500 mm^2), all of which originated in the clay deposit (071).

The overwhelming majority of the glass from the Area E excavations in terms of count, a total of 187 fragments (44.5 g., 16270 mm^2) was found within structure 5/6. Of these, 155 fragments (37.03 g., 13445 mm^2) were found within the main room of the structure, with the remaining 32 fragments (7.47 g., 2825 mm^2) found within the annex. Within the main room, 94 of the fragments were associated with deposit (021), six with deposit (023), 46 with deposit (037), four with deposit (070) and three with deposit (092). Two were found in the fill associated with the ephemeral stone subdivision (236). All 32 of the fragments from the annex were associated with deposit (096). Structure E7, the most southernly structure associated with the main row, had no associated occupation deposits and, as such, produced no glass.

The 'courtyard' or extra-mural activity areas surrounding the main row of buildings revealed considerable quantities of glass with 75 fragments (30.17 g., 8725 mm^2). Almost all of these came from the general deposits which appear to have formed contemporary with the majority of the structural occupation, with 32 fragments from deposit (012), eight from context (041), one from context (044) and 33 from context (097). Just one fragment was recovered from one of the occupation features present in the courtyard, specifically a burnt sediment (076) filling a possible posthole cut [077]. The overlying windblown deposit of loose sand present across the entirety of the main row also produced glass, with 41 fragments recovered from across contexts (005=007=018=026=027=031).

It remains to discuss the distribution of glass found away from the main row of structures. Structure E1, the only such building to be excavated beyond surface level, produced 20 fragments (7.28 g., 1725 mm^2), one from deposit (229), with the remaining 19 from deposit (217). Trench EX8 produced no glass. Trench EX10 excavated six fragments (8 g., 575 mm^2), though these all originated in the present day windblown surface sand (032). Trench EX12 produced just two fragments (1.1 g., 200 mm^2), again both from the modern surface deposit (059). Trench EX13 produced six fragments (5.24 g., 675 mm^2) of glass, again all from the modern surface (060). Trench EX14 produced no glass, while the modern surface deposits removed by trench EX15 resulted in just one fragment (1.29 g., 100 mm^2).

Of the glass from the excavations in Area E, 83.65% consists of undiagnostic body fragments (394 fr., 112.34 g., 36045 mm^2), 10.40% as rim and neck fragments (49 fr., 35.93 g., 6850 mm^2), 5.10% base fragments (24 fr., 37.02 g., 5000 mm^2) and just 0.85% as 'miscellaneous' parts (4 fr., 4.26 g., 450 mm^2).

CLOSED	**No. Fragments**	**No. Vessels**	**Find-spot (no. vessels)**
Flaring necks (straight)	16	13	E3 (2); E5/6 (3); E9 (1); E10 (1); Courtyard (4); E1 (1); EX13 (1)
Folded and flattened rims	5	5	E5/6 (2); E3 (1); E4 (1); Courtyard (1)
Ribbed necks (narrow)	5	2	E3 (1); E5/6 & Surface (1)
Neck type B	6	5	E5/6 (3); E10 (2)
Total	**32**	**25**	

FIG. 4.38. CLOSED VESSELS FROM THE EXCAVATIONS AT AREA E

Regarding the 49 rim and neck fragments, 32 belong to closed forms and 15 to open vessel forms, with two fragments proving unclassifiable. The closed vessel rim and neck types are dominated by *flaring necks (straight)*, of which there are 16 fragments representing a total of 13 vessels (Fig. 4.38). One of these was found in association with the surface remains explored by trench EX13 (060), with another from the outlying structure E1 (217). The remainder were found in association with the main row of buildings. Six fragments were found in the courtyard area (012)/(041)/(097), though this represents just four unique vessels as a number of these fragments join. Four fragments with *flaring necks (straight)* were found in structure E5/6 (021)/(096)/(152), though one of these from (096) appears to belong to the same vessel as a fragment found in the courtyard (097). Finally, two such vessels were found within structure E3 (010)/(078), along with one each from structures E9 (216) and E10 (017).

OPEN	No. Fragments	No. Vessels	Find-spot
Stepped rims	5	1	E5/6 & Courtyard (1)
Inwards-folded rims	4	4	E5/6 (2); Surface (2)
Flaring-sided bowl	2	2	E1 (2)
Rolled-in rims	2	2	E3 (1); E9 (1)
Plain rims (fine)	2	2	E4 (1); Surface (1)
Total	**15**	**11**	**-**

FIG. 4.39. OPEN VESSELS FROM THE EXCAVATIONS AT AREA E

The 15 ‘open’ fragments can be divided into five different types (Fig. 4.39). Most common are *stepped rims* with five fragments, though these all seem to belong to the same vessel giving a total of just one. All the *stepped rim* fragments were found in reasonably close proximity, with some in association with structure E5/6 (070)/(152) and the others in the extra-mural courtyard nearby (012)/(097). Four fragments have been categorised as *inwards-folded rims*, all of which represent a different vessel to give a total of four. Two of these were recovered from the windblown surface sand (026)/(027), with the remaining two from structure E5/6 - one in the main room (037) and the other in the smaller annex (096). Also among the open vessels are two fragments of the rare *flaring-sided bowl*. Both fragments are found in association with the outlying structure E1, with one in the surface sand (027) and the other in the intramural deposit (0217). However, in spite of their similarity and shared find-spot, the fragments possess slightly different profiles suggesting they represent two distinct vessels. Two open form fragments possessing *rolled-in rims* also represent two different vessels, with one from a late deposit in structure E3 (078) and the other from structure E9 (211). Finally for the open forms, two fragments with *plain rims (fine)*, one from the surface context (026) and the other from structure E4 (151), add another two vessels to the estimated tally. This would give a total of 11 open vessels excavated from Area E.

Of the four ‘miscellaneous’ fragments (Fig. 4.40), one consists of an *internal body fold* found in structure E10 (017), probably originating from a small open vessel around 75 mm in diameter. The remaining three fragments are all ‘applied’ pieces, including two joining vessel feet from the surface context (018) and a small decorative ‘button’ found in the courtyard (097). The two feet fragments (K-GL141 and K-GL645) join a third (K-GL392), which one will recall was found during the survey in E PU 3.

MISC	No. Fragments	Find-spot
Internal body fold	1	E10 (1)
Applied feet	2	Surface (2)
Applique button	1	Courtyard (1)
Total	**4**	**-**

FIG. 4.40. THE MISCELLANEOUS FRAGMENTS FROM THE EXCAVATIONS AT AREA E

Regarding the base fragments (Fig. 4.41), 22 of the total belong to 'push-up' forms. Seven of these are considered *edge of push-up bases*, with one of these found among the pre-structural deposits (098), one each in structures E3 (010) and E4 (038), two in structure E5/6 (152), one in the feature explored by EX10 (032), and one in the surface deposits (005). Of the other 'push-ups', one fragment of size *type 1* was found in structure E1. Of the five fragments of size *type 2*, one was found in structure E1 (217), two in structure E3 (010), and two in the surface deposits (005) and (007). Seven fragments belong to *type 3*, with two in structure E1 (217), one in E10 (017), two in E5/6 (021)/(037), and two in the surface sand (005)/(018). A single fragment of *type 4* was also found on the surface (026), while a fragment of *type 5* was recovered from structure E3 (010). These were joined by an unusual flat *disc* base from the annex of structure E5/6 (152) and a *ring base* from the surface deposit of EX13 (060).

BASES	No. Fragments	Find-spot
Push-up 1	1	E1
Push-up 2	5	E1 (1); E3 (2); Surface (2)
Push-up 3	7	E1 (2); E10 (1); E5/6 (2); Surface (2)
Push-up 4	1	Surface (1)
Push-up 5	1	E3 (1)
Edge of Push-up	7	Pre-building (1); E3 (1); E4 (1); E5/6 (2); E10 (1); Surface (1)
Flat disc vase	1	E5/6
Solid ring base	1	EX13 (1)
Total	**24**	**-**

FIG. 4.41. BASE FRAGMENTS FROM THE EXCAVATIONS AT AREA E

In addition to the *appliqué button* and two *applied feet* considered above, just one other fragment possesses any decorative embellishments - this in the form of a mould-blown *dimpled* pattern found in structure E5/6. In terms of colour (Fig. 4.42), most of the excavated fragments (379 fr.) have built up thick weathering crusts making colour determination impossible. That said, any hints of colour from such fragments fall overwhelmingly into the basic LGB group. For the remaining fragments, LGB glass makes up just over half of the total with 51.72% by count (45 fr. 27.19 g., 4425 mm^2), followed by CL glass on 10.34%, IB and TQ glass on 8.05%, OG and EG glass on 5.75%. Another 10.34% of fragments are of a M (modern) glass.

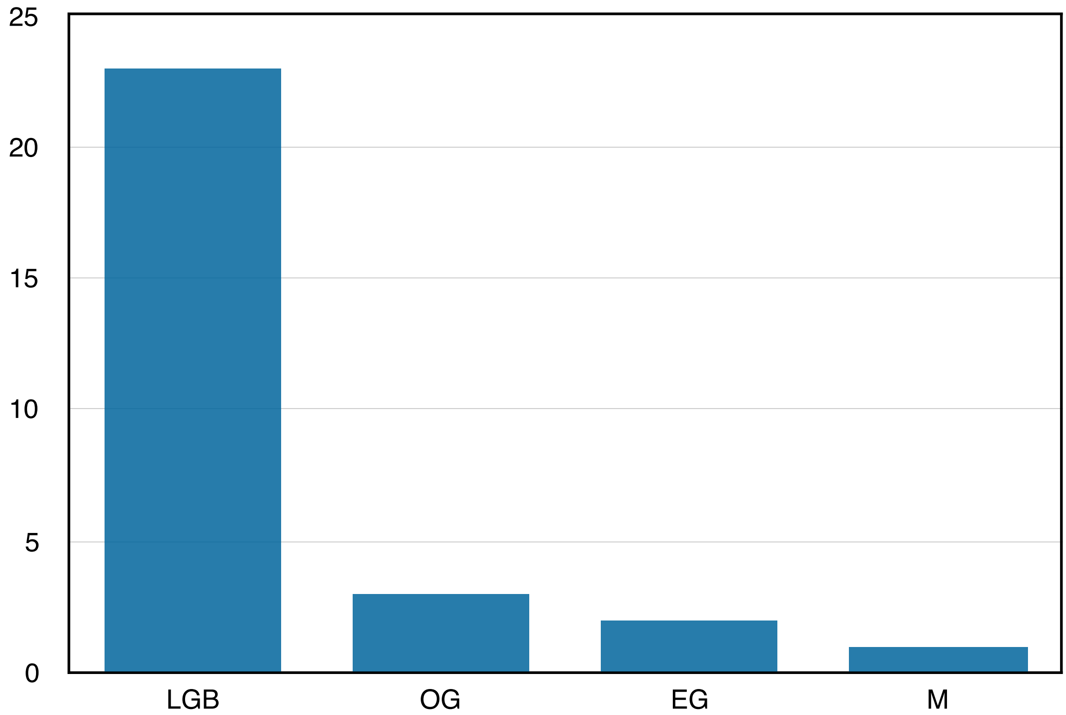


FIG. 4.42. COLOUR GROUPS FOR THE EXCAVATIONS AT AREA E

4.2.3.4. Interpreting the results from Area E

The distribution evidence from Area E suggested that most of the surface glass was not to be found over the main row of buildings but near to the outcropping bedrock and structure E1, though this likely reflects differential erosion processes - the latter areas being more exposed. As mentioned above, small numbers of vessels were found in association with each structure of the main row of buildings, with a spike in structure E5/6 (Fig. 4.43). This was also the largest structure, however the higher number of vessels found here does not seem purely by virtue of the building's greater extent of deposits. Rather, it is likely that the larger quantities of glass and bigger building size, complete with annex, are both indicators of an elevated wealth or different function associated with this structure. That said, it is worth reiterating that none of the structures, taken as a whole, produce anything like the quantity of vessels produced by the mud-brick building in Area ABC.

AREA E	Total Vessels	Closed Ves.	Open Ves.
Main Row:			
Pre-building	-	-	-
E11	-	-	-
E3	5	4	1
E10	3	3	-
E9	2	1	1
E4	2	1	1
E8	-	-	-
E5/6	11.5	9	2.5
E7	-	-	-
Courtyard	5.5	5	0.5
Surface (Main Row)	3	-	3
OUTLYING STRUCTURES:			
E1	3	1	2
EX8 Surface	-	-	-
EX10 Surface	-	-	-
EX12 Surface	-	-	-
EX13 Surface	1	1	-
EX14 Surface	-	-	-
EX15 Surface	-	-	-
Total	**36**	**25**	**11**

FIG. 4.43. ESTIMATED VESSEL QUANTITIES FOR THE AREA E STRUCTURES

The main row at Area E reveals a pattern, also seen in Area ABC, whereby a small quantity of glass appears to predate the erection of the excavated structures (Fig. 4.37), though the time delay between the two events is uncertain, and likely to be short. By way of interpretation, the most likely scenario is that the glass was brought to the site by the communities which were eventually to build the upstanding structures excavated above. The is little evidence for an earlier set of stone-defined structures, since removed. Rather, these communities probably employed simple timber or tent-like structures which leave little trace. It is significant, however, that the use of material culture predates the built environment. This precludes the suggestion that more substantial architecture (and thus evidence of more permanent settlement) is required before material culture can be fully incorporated into material life. Another feature similar to that of Area ABC is that considerable quantities of glass were found in extra-mural 'courtyard' deposits. Again with the same caveats as to find-spot not equating with use-context, this does at least raise the possibility that activity extended outside the surviving structural features.

There seems to be little value in terms of using these figures to extrapolate towards a predicted figure for the site as a whole. As at Area ABC, the main features were excavated - there is not another 'main row' at Area E for which the quantities of glass are unknown. Thus, the total of 45 vessels estimated for Area E, where most of the buildings were excavated, may not be a bad figure to stick with. Admittedly there is certainly room for further glass to remain undiscovered - particularly in the courtyard. and in the unexcavated contexts.

In terms of the role of the glass, the 45 estimated vessels from Area E suggest a different emphasis to that seen for Area ABC, though the range of types in the assemblage are broadly the same. Of these vessels, 32 belong to closed forms, 12 to open forms and one to a semi-open form. Focussing for a moment on just the survey results, the nine vessels recovered from the site as a whole are heavily focused on closed forms with seven such vessels. These include the usual range of bottles with *folded and flattened rims* and *flaring necks* in a variety of rim finishes. The single open vessel is a basic tableware with a *plain rim (fine)* while the semi-open vessel is probably a modern form.

The excavated material presents a different balance in the proportion of these basic forms. Open forms make up 11 vessels or 30.56% of the excavated assemblage, a higher proportion than seen in the survey material which might relate to the fact that the excavations focus on the structural features whereas the survey covered the site as a whole. It could thus be argued that open vessels, interpreted as tablewares involved in practices of consumption and even display, were strongly confined to structures whereas closed vessels were more likely to be used beyond the built environment. In terms of the range of types the assemblage slightly overlaps with that seen at Area

ABC, with small bowls with *stepped* rims, *plain rims (fine)* and *inwards-folded rims* present. In terms of the differences, two strange open vessels with *flaring-sided* profiles were found in association with structure E1, whereas two vessels with *rolled-in rims* where found in association with the main row. The range of variety in open forms contrasts with the closed forms - as shall be considered below. The implication might be that the use of open vessels was more unusual, diverse and less prescribed in terms of being limited to specific functions and roles.

Closed forms still dominate with 25 vessels, or 69.44% of the excavated assemblage. Of these, 18 consist of vessels with *flaring necks (straight)* and their related partial necks in *type B*. The other closed forms include five vessels with *folded and flattened rims* and just two with *ribbed necks (narrow)*. This is an extremely limited range of closed vessel types, and suggests an equally limited range of functions. If it is accepted that the *ribbed necks (narrow)* represent small toilet bottles then it is clear that this role for glass was restricted in the Area E structural complex, just as it was in Area ABC. The five vessels with *folded and flattened rims* indicate another minor role for glass as a utilitarian storage item. Interestingly, these were not concentrated in one structure but divided between structures E5/6, E3 and E4, as well as in the courtyard area. If this distribution relates to use in any way then it suggests that each structure utilised one or two of these bottles for their own needs, rather than evidence of one building functioning as a place for bulk storage. The 18 vessels with *flaring necks (straight)* and neck *type B* have been previously interpreted as smaller and more delicate storage items or as serving tablewares, and it is in this function which understanding the role of glass in Area E depends. Most come from the main row of buildings, and are concentrated in structure E5/6 and E3, perhaps suggesting a different function or socio-economic status for these structures.

As a final point, it is worth noting that both the courtyard and E5/6 assemblages are strongly dominated by closed forms, with very few open forms at all. In the case of structure E5/6 this goes against what might be expected based on its comparatively large size. If size is equated with wealth, then we might expect a greater focus on presentation and display, and thus open vessel forms. This seems to be supportable in the mud-brick building at Area ABC, however it is certainly not in structure E5/6 in Area E. Either the link between wealth and open vessels is incorrect, or the size of structure E5/6 is not an indicator of wealth, but a particular function. Indeed, this later scenario seems the most likely - though it is impossible to be specific as to what this might be other than to say it is more likely than not to have been ‘practical’ in nature. Again, as with Area ABC, decorated glass is extremely rare, making up just 0.61% of the Area E assemblage. Coloured glass is also rare, with the assemblage dominated by basic LGB glass of a nature green-blue hue. As such, all the evidence supports the conclusion that the main role of glass at Area E was of a practical nature involving a mix of domestic functions, ranging from storage bottles to tablewares to toiletry items.

4.2.4. Area F

4.2.4.1. The archaeology

Fieldwork at Area F (Fig. 4.44) was limited to topographic survey, artefact collections from designated 'pick-up' areas, and some limited surface excavations (see §A.1.4; EX43-48). This revealed a similar site to Area E, with a row of simple structures accompanied by more ephemeral features in the surrounding area. Area F seem less substantial than Area E, though it has been more disturbed. Again, Area F seems to have been contemporary with the above occupations. A total of 30 fragments of glass (22.72 g., 3750 mm^2) were collected from Area F. Just one of these originated from the brief excavations at the site (1.49 g., 350 mm^2), with the remaining 29 collected during the surface survey (21.23 g., 3400 mm^2).

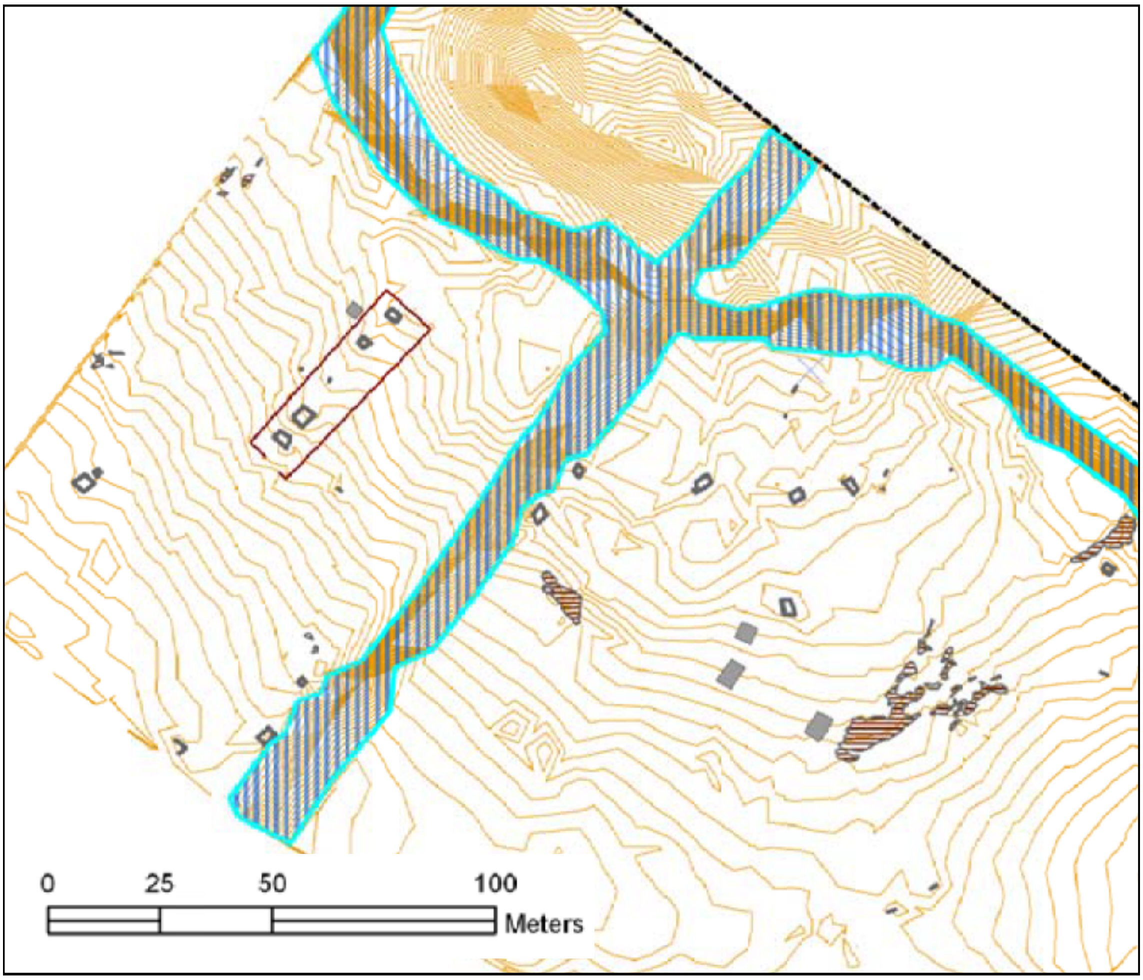


FIG. 4.44. PLAN OF AREA F

4.2.4.2. The glass from the site survey and excavations (Area F)

Very little glass was recorded during the surface scatter plots (Fig. 4.45). Most of this was recorded in the east of the site outside the fenced area, where a small number of stone structures had been earlier identified by the project. This quantity and distribution pattern is echoed by the ceramic assemblage.

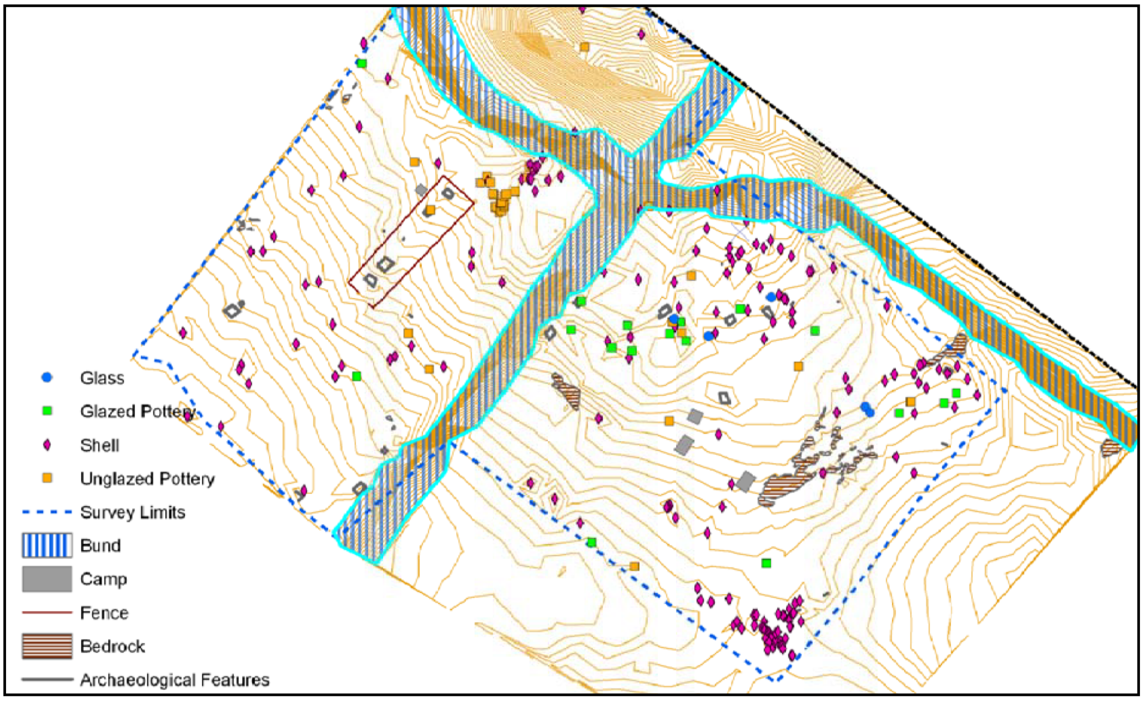


FIG. 4.45. ARTEFACT SCATTER PLOT FOR AREA F

Pick-up Zone	Glass fr.	fr./m²	g./m²	mm²/m²	Pottery fr.	Pottery fr./ m²
F PU 1	0	0	0	0	0	0.00
F PU 2	3	0.00	0.00	0.13	2	0.00
F PU 3	2	0.09	0.03	7.46	1	0.04
F PU 4	1	0.02	0.02	3.10	3	0.06
F PU 5	21	0.13	0.10	14.68	45	0.28
TOTAL	**27**	**0.01**	**0.01**	**1.23**	**51**	**0.02**

FIG. 4.46. RESULTS OF THE GLASS AND POTTERY PICKUPS FROM AREA F

The five ‘pick-up’ areas produced 27 fragments of the survey glass, with the other two having no find-spot information beyond ‘Area F’ (Fig. 4.46). Minuscule densities of glass were recorded, with F PU 5 being the most productive with 21 fragments at a concentration of 0.13 fr./m^2. No glass at all was found in F PU 1, in spite of its location within the original fenced part of Area F.

A total of 79.31% of the glass from the Area F survey (23 fr., 13.3 g., 2425 mm^2) were undiagnosotic body fragments, with 17.24% base (5 fr., 7.33 g., 900 mm^2) and 3.45% rim fragments (1 fr., 0.6 g., 75 mm^2). The rim fragment consists of an open vessel with an *inwards-folded rim* found in F PU 2. The base fragments are all ‘push-up’ varieties, with four *edge of push-ups* from F PU 5 and a single size *type 3* of unknown provenience. None of the fragments from the survey exhibit any decoration. In terms of colour, the majority, 79.31%, are of the basic LGB colour (23 fr., 14.22 g., 2450 mm^2), with 10.34% OG glass (3 fr., 3.83 g., 550 mm^2), 6.90% EG glass (2 fr., 1.89 g., 250 mm^2), and 3.45% modern glass (1 fr., 1.29 g., 150 mm^2).

The single fragment originating from the superficial excavations of Area F consists of an undecorated, undiagnostic body fragment. This fragment was found in trench EX46, in the deposit (612) which covered the walls of an ephemeral rectangular stone feature (626). The fragment is weathered but probably consists of LGB glass.

4.2.4.3. Interpreting the glass from Area F

The paltry sum of glass in Area F, whether in density or total quantity, isn’t easy to explain. It is unlikely that depositional processes are any different in this part of the landscape than at Areas ABC and E, however the vicinity has been more extensively disturbed by recent activity - not least the bulldozing of part of the site during the creation of the southern boundary fence of the Natural Reserve. As an alternative, it is possible that this part of the study region has been carefully combed in the past by previous surveyors, though again this seems unlikely. All told, the most convincing explanation is that the lower quantities of glass at Area F do in fact accurately reflect past reality. Perhaps this part of the Kadhima region was inhabited by a socio-economic group which did not, or could not, possess much material culture. As such it is quite tempting to postulate the seasonal return of a semi-nomadic community which based itself on the edge of the settlement, arriving to take advantage of the local water and grazing resources. This hypothesis remains tentative, without further evidence, and it remains uncertain why such a community would feel the need to erect stone foundations at all when they almost certainly would have travelled with tent structures. While the single vessel identified in Area F belongs to an open form, though there is not much more that can be said here owing to the low numbers. The high quantity of LGB glass and absence of decorated fragments match the pattern seen at Area ABC and Area E.

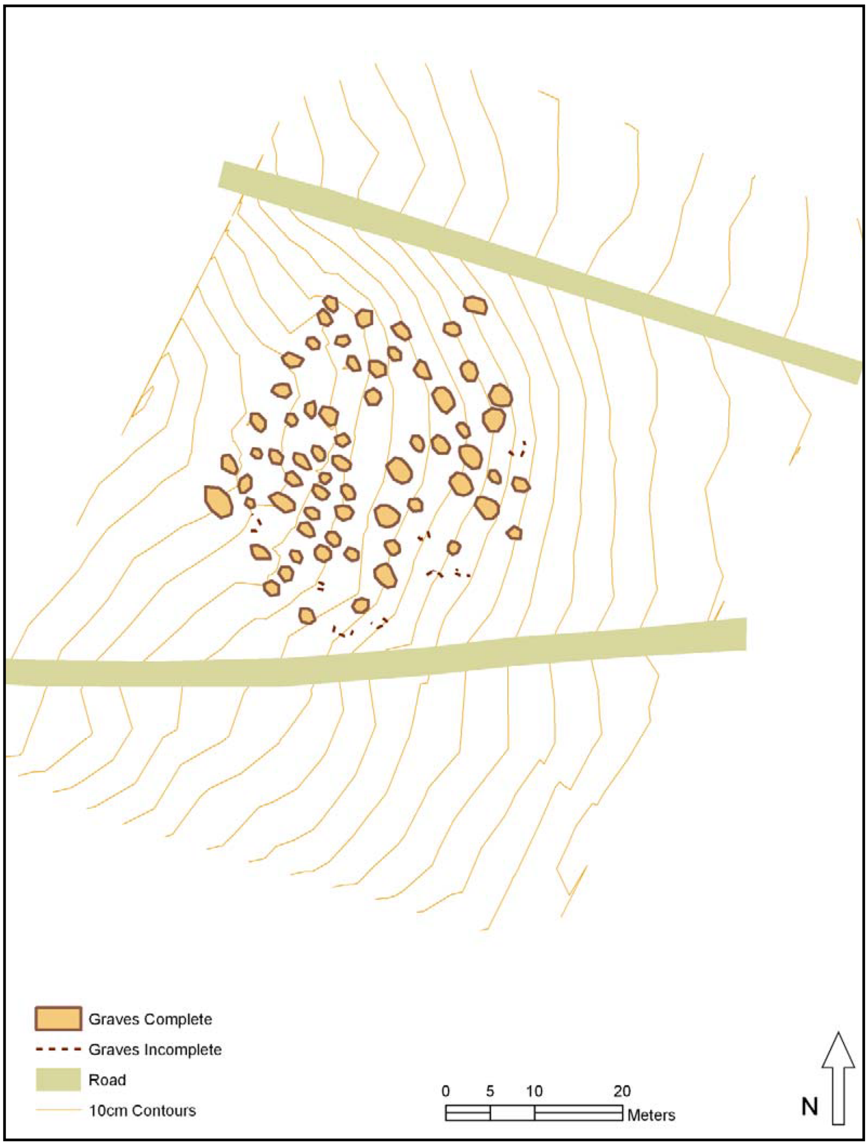


FIG. 4.47. PLAN OF AREA G

4.2.5. Area G

4.2.5.1. The archaeology

Area G (Fig. 4.47), a cemetery with some 76 graves, was explored primarily through excavation (see §A.1.5). The graves were demarcated by oval arrangements of stones, but revealed no grave goods and no skeletal material. The lack of goods and the orientation of the graves fits with Islamic burial practice, however there is no dating evidence to confirm whether or not the cemetery is associated with Areas ABC, E and F. No glass was found during the excavation of any of the graves. This is symptomatic of the lack of artefactual material in general. Clearly grave goods were not interred along with the deceased.

4.2.5.2. Interpreting the absence of glass from Area G

The absence of glass from the cemetery, Area G, is not unusual, considering Islamic burial practice. The grave markers show a rough alignment on *qibla*, while the excavations produced no grave goods - or indeed much trace of human remains. Furthermore, there is no real reason to assume that these graves are contemporary with the Early Islamic settlements known within the Kadhima region, with this form of simple burial practiced by nomadic communities right up to the pre-modern period (ref). Either way, the absence of glass or any other material culture does not seem to require further explanation.

4.2.6. Summary of the results from the Kadhima region

It was shown that a total of 1392 fragments (1069.66 g., 180025 mm^2) of vessel glass were recovered from the Kadhima region. Similar fragment numbers, representing the vast majority of the total, originated from Area ABC (663 fr.) and Area E (658 fr.), with smaller numbers from Area F (30 fr.) and the Transect Survey (41 fr.), and none from the cemetery at Area G. Before comparing these quantities, it is important to note that weight and estimated surface area suggest a different distribution pattern.

	Count %	Weight %	Surface Area %	Vessels %
Area ABC	47.63	59.59	53.93	54.78
Area E	47.27	29.82	37.91	39.13
Area F	2.16	2.12	2.08	0.87
Transect Survey	2.95	8.47	6.08	5.23

FIG. 4.48. RELATIVE QUANTITY OF GLASS FROM THE KADHIMA SITES

Measured in these ways, the quantities from the Transect Survey (90.59 g., 10940 mm^2) and Area F (22.27 g., 3750 mm^2) remain small and uncontroversial. The main difference is in the relative proportions of the assemblage found between Areas ABC (637.36 g., 97090 mm^2) and E (318.99 g., 68245 mm^2). By count, Area ABC possesses 47.63% of the assemblage to Area E's 47.27% (Fig. 4.48). Yet by weight and estimated surface area the distribution shifts dramatically towards Area ABC, which now possesses 59.59% by grams and 53.93% by mm^2 compared to Area E's 29.82% and 37.91% respectively. Estimates of the number of vessels which these figures represent tend to support the weight and surface area measurements. Of a total of 115 vessels, 63 (54.78%) originated in Area ABC, 45 (39.13%) in Area E, one (0.87%) in Area F, and six (5.23%) in the transect survey.

How can this shifting pattern be explained? First of all, the slightly higher figures for the proportion of the assemblage originating in the Transect Survey when measured by weight, surface area and vessel count reflect a methodological bias towards larger and more robust fragments. This cannot be the case for the discrepancy found between Areas ABC and E as these assemblages were collected according to identical strategies. One way of looking at this issue is to compare the average fragment weight and surface area from Areas ABC and E (Fig. 4.49). The averages from Area E are around half those from Area ABC. Thus the glass from Area E is relatively more fragmentary than Area ABC, accounting for the similar count but different weight and surface area proportions. Explaining why this is the case is a more complicated matter. Fragmentation rates relate to a host of factors, ranging from the types of vessels present in the assemblage, the manner in which they were used and discarded, and the taphonomic processes which have subsequently affected the burial contexts. There are no obvious differences in taphonomy between these two sites, though it is impossible to know what local disturbances might have taken place over the last 1200 years. As such, judgement will be suspended on this question until the various 'archaeological' factors have been considered.

	Ave. Fr. Weight (g.)	**Ave. Fr. Surface Area (mm^2)**
Area ABC	0.96	146.44
Area E	0.48	103.71
Area F	0.74	125
Transect Survey	2.21	266.83

FIG. 4.49. FRAGMENTATION RATES ACROSS THE KADHIMA SITES

To properly compare the amount of glass between the respective areas, it is necessary to compare relative quantities rather than absolutes. As such, the results from the Transect Survey stand alone, with no comparable data to relate them to. For Areas ABC, E and F, the easiest means of comparing quantities is by looking at the glass density figures resulting from the 'pick-up' surveys (Fig. 4.50). All the measures suggest that surface quantities of glass are slightly more concentrated at Area E than at Area ABC, with very small amounts from Area F.

	Fr./m2	Weight/m2	Surface Area/m^2
Area ABC	0.08	0.06	8.18
Area E	0.11	0.07	11.64
Area F	0.01	0.01	1.23

FIG. 4.50. GLASS FRAGMENTATION RATES FROM THE KADHIMA REGION

The excavation data is much harder to compare without reliable accounts of the volume of sediment and proportion of structures excavated. Another way quantity might be compared is to employ the structural features as the framework of analysis. Here the 24 vessels identified among the glass assemblage from the large building and the seven from the well complex can be compared with the 32 vessels from the main row of structures within Area E, in addition to the four vessels from the outlying buildings. Thus, while the Area E excavations produced slightly more glass in a relative sense, each individual structure within Area E produced much less glass than the single, much larger and more complex building excavated in Area ABC.

What then of form and the role of glass at the Kadhima sites. In summary, on the basis of the rim-defined vessel forms, Area E presents quite a different assemblage to Area ABC. Area E boasts an altogether more practical assemblage, seemingly less focused on tablewares and display. It is tempting to explain this through socio-economic factors, the individual buildings at Area E being less substantial than that at Area ABC. However, it may also relate to the function of the relative settlement areas, with Area E perhaps fulfilling a more practical and less formal role than Area ABC. Indeed, should the large building at Area ABC be interpreted as relating to the institutional administration of the well and the main row of buildings at Area E a less formal offshoot of that, then this is the explanation that perhaps makes the most sense.

The more ‘aesthetic’ appearance of the glass, that is, decoration and colour, also helps illuminate how glass was incorporated into material life in the Kadhima region. The first point to note is the sparsity of decoration. Just 46 fragments have been decorated, amounting to just 3.30% of the total assemblage by count. What’s more, many of these fragments belong to the same vessel. For example, of the 35 fragments with mould-blown *dimpled* decoration, 31 represent a single vessel found in the east room in the large building in Area ABC. Likewise, three of the four *applied feet* fragments can be refitted together. Already this serves as a demonstration of the rarity of decoration in the glass used at the site. Why might this be the case? Either decorated glass was not desired, not obtainable - whether due to its value or lack of supply - or generally not that common in the Early Islamic glass tradition. All these factors undoubtedly were at play, however there is a strong possibility that the latter scenario goes furthest in explaining the lack of decorated glass.

As an aside, it is worth mentioning that the range of decorative techniques is limited and basic. The more elaborate decorative techniques traditionally associated with the Early Islamic glass tradition, such as lustre painting and scratch-engraving, are entirely absent. Indeed there is just one piece of *cut* glass, where an unelaborate circular pattern was ground into the interior of the *internally-stepped base* fragment. Most of the decoration either consists of mould-blown *dimpled* glass or applied techniques, such as the *feet*, *button* and *trails*. The distribution of the decorated glass is worth brief consideration. Ostensibly the vast majority, 38 fragments, originated in Area ABC, though it has been seen how 31 of these belong to the same vessel. Of the six from Area E, three belong to the same vessel. As such, decorated glass is slightly more common in Area ABC, but not by any significant margin. In summary, decorated glass was rare in the Kadhima region sites, as well as being undramatic in style. This seems to support the earlier suggestions that glass was employed for its practical and functional value in Area ABC and Area E, rather than as a 'luxury' item purely reserved for display. It could perhaps be argued that the assemblages are thus low in value. However, it seems more likely that elaborately decorated glass was generally not that common in everyday glassware assemblages, this being a false impression cultivated by the prominence of museum and private collection material in the literature. Highly decorated glass was likely to be so rare as to be generally unaffordable for all but the most wealthy elites, and thus not really part of everyday assemblages. More practical items however seem to have been easily obtainable and thus a common feature of everyday material life.

A similar picture is presented by glass colour or 'metal'. Much of the glass, 636 fragments, possessed such quantities of weathering crust that the identification of colour was either unreliable or impossible. Weathering was particularly substantial in the buried assemblage, the surface material having had its weathering eroded away by a natural 'sand-blasting' process. For the 743 fragments where colour was identifiable, just nine distinct categories were identified. Of these, a basic naturally-coloured LGB glass dominates with 522 fragments. This pattern remains fairly consistent throughout, with LGB glass making up c. 75% of the assemblage in Area F, Area ABC and in the survey of Area E, however, it makes up just 51% of the Area E excavations. Of the remaining colour assemblage, 35 fragments were definitely modern. Accompanying these are 69 fragments of EG glass, many of which are likely to represent recent or modern bottle glass, though it is hard to determine their antiquity when heavily weathered. Of the definitely archaeological material, OG glass appears in just 42 fragments, and also represents a natural colouration. Twenty-seven fragments of CL glass appear to have been deliberately discoloured, while the five BL and 30 TQ fragments certainly represent deliberately coloured glass. One of the more interesting naturally-coloured metal groups is the small quantity of 13 fragments of IB glass - as shall be seen, one of the most common colours at the site of Unguja UKuu, and which might have a slightly later date range than the standard LGB glass. As far as this data can be interpreted, the most important point seems to be the narrow range of colours, with just 7 definitely archaeological types. Of these, four represent standard naturally-coloured groups, or 90.30% of the Kadhima region assemblage by fragment count, with the remaining three, representing just 9.70% of the assemblage, deliberately coloured or decoloured. As such, it seems reasonable to assert that coloured glass was not an important part of the Kadhima glass assemblage. This fits with the perspective gained from the study of decoration and the suggestion, based on the rim forms and types, that the assemblage was primarily practical in purpose.

4.3. Glass from the Natural Reserve & Mudira Region

Fieldwork in the 'Natural Reserve & Mudira' study region focussed on the general landscape, a walled enclosure known as the 'Fort', and a small settlement at Mudira (Fig. 4.1, Fig. 4.51).

4.3.1. The Natural Reserve landscape survey

4.3.1.1. The archaeology

The landscape was subject to a randomised survey aimed at exploring the potential for new sites and collecting artefactual material (see §A.2.1.1). A total of 48 sites were added to the 'locus' database, mostly scatters of artefacts and ecofacts, prehistoric burial monuments, and ephemeral structural features. The results show that the Kadhima landscape was not the only part of the coastline to exhibit lengthy occupation, however no such settlements akin to those at Areas ABC, E and F were identified.

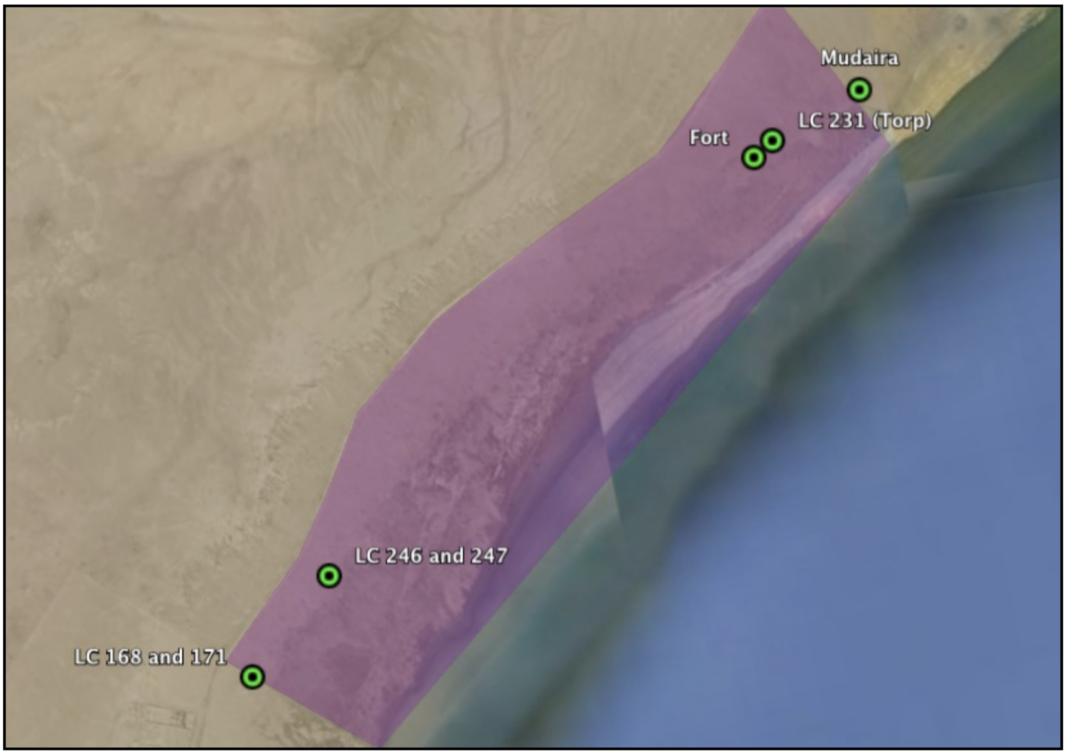


FIG. 4.51. MAP OF THE NATURAL RESERVE & MUDIRA STUDY AREA

4.3.1.2. The glass

The survey of the natural reserve produced a total of 13 fragments of glass (20.62 g., 2450 mm^2). Five fragments originated from LC171, a series of structures situated close to the southern perimeter of the park and determined to be an extension of Area F (Fig. 4.52). All five are undiagnostic body fragments, none of which have been decorated. In terms of colour, three consist of a basic LGB glass, one is of a modern EG glass, while another one of the fragments is too weathered for colour identification.

	No. Fragments	**Diagnostics**	**LC Interpretation**	**LC Date**
LC163	2	Edge of push-up; Push-up L	Artefact scatter	?
LC164	2	Edge of push-up	Artefact scatter	?
LC170	1	Edge of push-up	Fort	Early Islamic?
LC171	5	-	Structures	Early Islamic
LC314	2		Artefact scatter	Early Islamic?
LC319	1	Plain rim (thick)	Well	Modern
Total	**13**			

FIG. 4.52. GLASS FROM THE NATURAL RESERVE SURVEY

In the western part of the reserve, LC163 and LC164 each produced two fragments of glass. Both those from LC163 are 'push-up' base fragments, one an *edge of push-up* and the other in size *type L*, and both of undecorated LGB glass. One of the LC164 sherds is an undiagnostic body fragment, while the other represents an *edge of push-up* base. Both were produced in LGB glass. Two fragments were recovered from LC314, an area of 100 x 100 m containing scatters of shell and pottery, some of which is Early Islamic in date. Both of these are undiagnostic body fragments, one produced in LGB glass while the other is composed of modern material. A single fragment was found in association with LC319, a well with a modern superstructure and buried cistern which possibly conceals older foundations and which also produced Early Islamic pottery. This fragment belongs to an open vessel with a *plain rim (thick)*, and was produced in LGB glass. Finally, one fragment was identified at LC170 - the 'Fort' - and consists of an *edge of push-up base* in OG glass.

4.3.1.3. Interpreting the glass from the Natural Reserve survey

It is clear that glass is not to be widely found within the natural reserve. Where it was found, this was in small numbers. That said, its absence at many sites which produced equally small counts of Early Islamic-type pottery is not unsurprising, due to the low assemblage quantities in each case. Perhaps the most notable discovery is that just a single fragment was found in the surface deposits associated with the 'Fort'. This is in stark contrast to the higher quantities found in relation to the smaller structures in the Kadhima Region such as Areas ABC, E and F. It is hard to say much about the role of glass based on this small quantity of information. The rim fragments from the Natural Reserve survey allow the identification of just one open vessel form in a nondescript type with a *plain rim (thick)*, found in association with the modern well (LC319) with potentially earlier origins.Obviously it is impossible to make any judgements on the role of glass on this basis. Likewise, it is of little significance to say that none of the glass is decorated, as it is clear that very few decorated fragments are even to be expected in a large assemblage. Furthermore, the observation that all the glass possesses naturally-coloured metals in which LGB glass dominates is to be expected. One point that the colours do raise is that, with the exception of two fragments from the survey in EG and MOD glass, the rest of the assemblage fits with an Early Islamic date. Indeed other than these two modern metals, there are no colour groups or vessel types that suggest anything other than an Early Islamic date.

4.3.2. The Fort excavations (LC170)

4.3.2.1. The archaeology

The ‘Fort’ represents a large walled enclosure (Fig. 4.53), with a stone building located on top of a mound over the western corner (see §A.2.1.2). The site was subject to planning and excavation of both the building, the enclosure wall, and a small part of the interior. This work revealed artefactual material probably dated to the 8th century AD, thus contemporary with the main sites in the Kadhima region. Otherwise it was suggested that the interior might be empty and that the corner mound and building could be a later addition to the site.

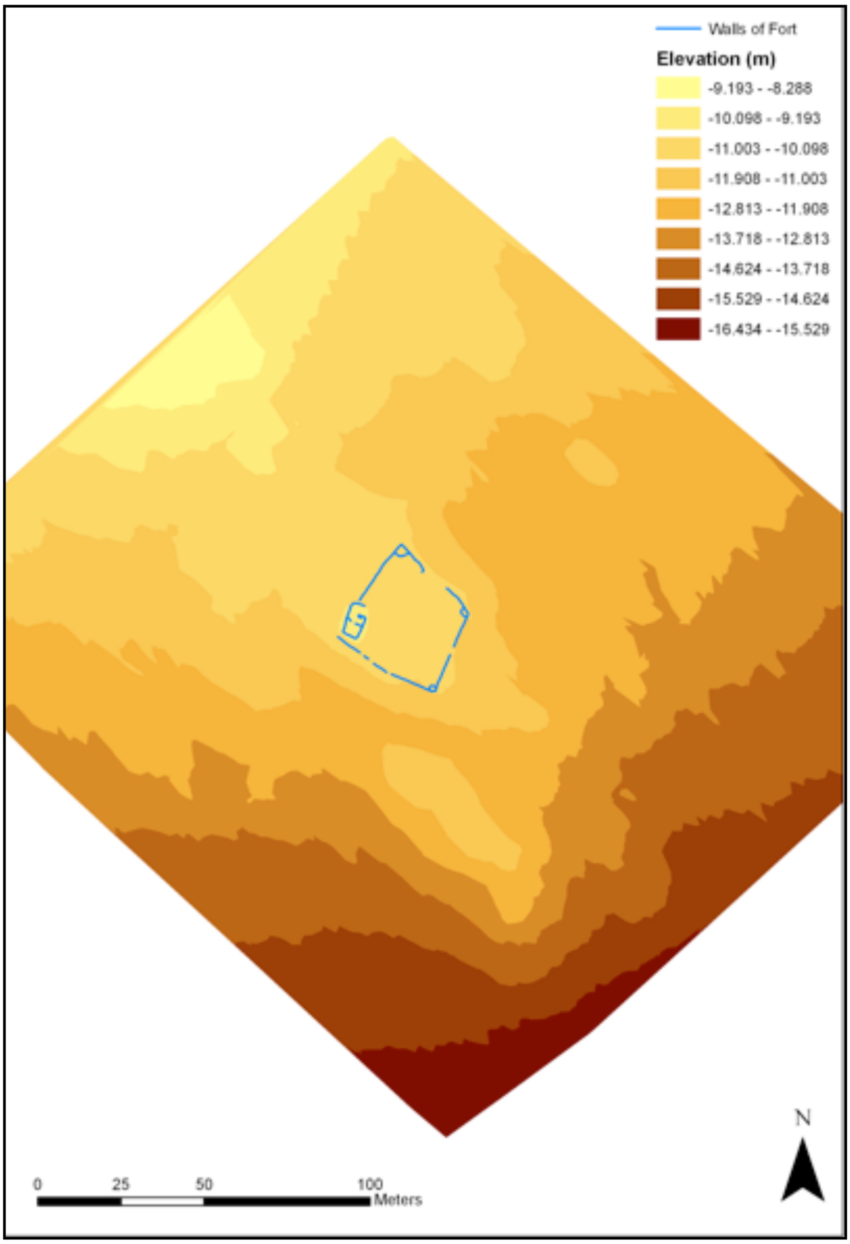


FIG. 4.53. PLAN OF THE ‘FORT’ (LC170)

4.3.2.2. The glass

The excavations at the 'fort' produced just 5 fragments of vessel glass (1.1 g., 425 mm^2), thus confirming the impression of sparsity given from the survey results (Fig. 4.54). These were all from the post-abandonment accumulation of windblown sand and wall rubble (518) - located just inside the northwestern perimeter wall (506). Four consist of undiagnostic body fragments of undecorated LGB glass. The remaining fragment, in the same metal, belongs to a closed vessel a *flaring neck (rolled-in rim)* (Fig. 4.55). No vessel glass was found in association with the west corner structure.

	No. Fragments	**Weight (g.)**	**Surface Area (mm^2)**
Enclosure Interior	5	1.1	425
Western Corner Structure	-	-	-
TOTAL	5	1.1	425

FIG. 4.54. QUANTITY OF GLASS FROM THE 'FORT' EXCAVATIONS

CLOSED	**No. Fragments**	**No. Vessels**	**Findspot**
Flaring neck (rolled-in rims)	1	1	Enclosure interior (1)

FIG. 4.55. CLOSED VESSELS FROM THE 'FORT' EXCAVATIONS

4.3.2.3. Interpreting the glass from the Fort

As the excavations of the fort produced just five fragments, with none in association with the substantial building over the west corner, it is reasonable to assume that glass did not play an important role in material life at the 'Fort', especially in comparison to the Kadhima region settlements. That said, a polychrome glass bangle dating to the 15th century or later was found in the upper fill (510) of the west corner structure. This, and the absence of glass from this part of the 'fort', might indicate the corner structure (or indeed the whole enclosure) was a later imposition upon an area of earlier activity. Again, as with the survey data, it is hard to say much regarding the potential small role played by glass, with the one closed vessel form from inside the main enclosure, of a type with a *flaring neck (rolled-in rim)*, existing in isolation.

4.3.3. Mudira survey

4.3.3.1. The archaeology

The small settlement at Mudira was visited only once (§A.2.2), and just a brief artefact collection undertaken (Fig. 4.51). The site appears similar to Areas E and F in architectural terms, though perhaps on a smaller scale. The artefactual material appears to date to the late-7th to 8th century AD.

4.3.3.2. The glass

A single fragment of glass, an undiagnostic body fragment of LGB glass, was collected from the surface at Mudira.

4.3.3.3. Interpreting the glass from Mudira

The single fragment of glass from Mudira was removed as proof of concept. Although more fragments were present at surface level there was sufficient time to conduct a proper survey of the site and so the decision was taken to leave the surface material in situ. The presence of glass in combination with the same architectural traits as seen at Area E, Area F and (later) in EX50-53 at Mughaira suggests that glass would have played some role in material life at this Early Islamic site. Unfortunately it is impossible to say more on this point.

4.3.4. Summary of the Results From the Natural Reserve & Mudira Region

Altogether a paltry sum of 19 fragments of glass (21.79 g., 2900 mm^2) were recovered from the Central Region. Of these, 13 fragments (20.62 g., 2450 mm^2) were recovered from the Natural Reserve survey, five (1.1 g., 425 mm^2) from the excavations at the 'fort' and just one from the survey of Mudira (0.07 g., 25 mm^2). Clearly glass was present across the wider landscape, and employed in small quantities at sites like Mudira and the Fort. Its presence in some of the artefact scatters is hard to understand. It is possible that these ephemeral sites, generally devoid of structural remains, may have formed following seasonal settlements. Clearly this is a different settlement practice from the sedentary sites seen in the Kadhima region and perhaps at Mudira, representing a lifestyle to which large quantities of glass and portable material culture in general was not suited. With so little glass at the Fort, it is hard to envisage this as some kind of palatial feature or caravanserai concerned with settlement or hospitality, where one would expect glass to feature in the material landscape. Rather, the impression given by the name and the size of the enclosure may be misleading, perhaps with the site being used more rarely or for activities that did not involve much material items, such as for animal corralling or as a point of occasional refuge.

There is little value in comparing the relative quantities of glass between these sites as each represents vastly different contexts and research methodologies. It is perhaps worth pointing out that a large difference in fragmentation rates between the material from the excavations at the 'Fort' (0.22 g./fr.) and the Natural Reserve survey (1.59 g.,/fr.) is likely a methodological bias, with larger fragments more likely to be noticed and collected during the survey. The small numbers make it impossible to say anything about the role played by the little glass that has been found, or to read much into the lack of decorated fragments or coloured glass.

4.4. Glass from the Subiyah Region

Fieldwork in the Subiyah region focussed on a large settlement at Mughaira, its surrounding landscape, and a series of ceramic scatters close to the shore-line known as 'torpedo jar' sites (Fig. 4.1; Fig. 4.56).

FIG. 4.56. MAP OF THE SUBIYAH STUDY REGION

4.4.1. The landscape survey

4.4.1.1. The archaeology

The landscape survey revealed an ephemeral pattern of occupation indicated by artefact scatters as well as enigmatic structural remains and burial features (§A.3.1).

Unlike in the Kadhima region, there does not appear to have been as much ‘off-site’ activity contemporary with the Early Islamic settlement of Mughaira, at least not on the site’s northeastern side where the survey was focused. Indeed, most of the activity seems to have been related to burial practices, perhaps prehistoric in date.

4.4.1.2. The glass

Aside from the Mughaira settlement and ‘Torpedo Jar’ sites (see below), the Subiyah regional survey produced just two fragments of glass. One of these originated from LC238.1 - a series of three ephemeral ‘U-shaped’ stone features - and consists of a ‘push-up base size *type L* in LGB glass. The other consists of a modern body fragment from a shell midden and pottery scatter at LC300.

4.4.1.3. Interpreting the glass from the landscape survey

There is little to be said about the landscape survey material owing to the small quantity collected. The main point is that this suggests that glass was not widely distributed outside of the Early Islamic site at Mughaira. This appears to be in contrast to the picture presented by the Kadhima region landscape survey. It is not certain why this may have been the case. Indeed, as Mughaira represents a much larger site than those of Area ABC, Area E and Area F, a wider spread would have been expected. There are no taphonomic factors which could explain this result.

4.4.2. Mughaira

4.4.2.1. The archaeology

The site of Mughaira was subject to both ground-based survey and aerial photography, as well as several excavations (§A.3.2). The site extends along an inland cliff for some 1000 m east to west and 200 m north to south (Fig. 4.57). As many as 75 definite structures were identified, many representing quite substantial buildings, along with a further 41 more ephemeral ‘stone features’. These come in a range of architectural forms, and appear to have been organised into several ‘hamlets’ within the site. A large, three-roomed stone-walled structure, perhaps with earlier timber structure, was excavated by EX49, producing a wealth of material culture, and revealing extramural occupation in a ‘courtyard area’. In a part of the site nearby to the cliff-edge, excavation (EX50, 52 and 53) took place of three smaller structures architecturally identical to those seen at Area E. In contrast to the building in EX49 (Fig. 4.60), these three structures produced very little material culture. The ceramic and C-14 dates from Mughaira, as they presently stand, indicate a mid-7th to 8th century occupation, thus contemporary with Areas ABC and E.

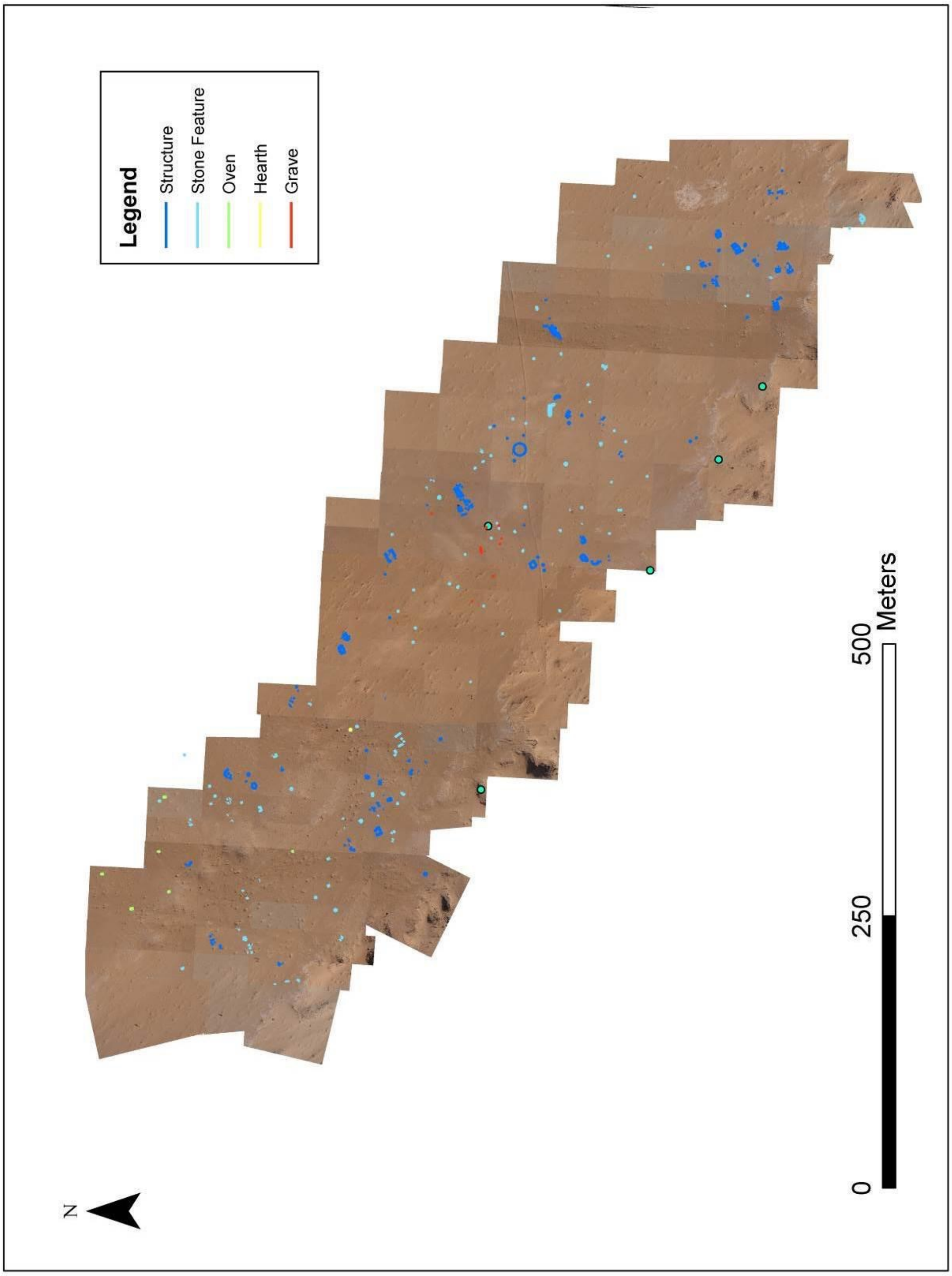


FIG. 4.57. MAP OF MUGHAIRA

A total of 596 fragments of glass were recorded from Mughaira. This quantity can be broken down into the survey material (36 fr., 30.02 g., 4650 mm²) and the glass from the excavations (560 fr., 487.6 g., 93360 mm²). In turn, it is worth distinguishing between the 473 fragments (392.82 g., 75435 mm^2) of glass from the building explored by EX49, and the 83 fragments (92.19 g., 17375 mm^2) from the complex of three structures explored by trenches EX50, EX52 and EX53. A small number of fragments (4 fr., 2.59 g., 550 mm^2) originated from minor trenches EX32 and EX36.

	No. Fragments	Diagnostics	Locus Interpretation	Locus Date
LC226	1	Applied pad base	General site	Early Islamic
LC227	1	-	General site	Early Islamic
LC233	1	-	General site	Early Islamic
LC233.2	1	Push-up type 6	Structure	Early Islamic
LC233.3	2	-	Structure	Early Islamic
LC233.4	1	Edge of push-up	Structure	Early Islamic
LC233.5	1	-	Structure	Early Islamic
LC233.7	1	-	Structure	Early Islamic
LC233.22	8	Edge of push-up	Structure	Early Islamic
LC233.25	3	Neck type C	Structure	Early Islamic
LC233.26	5	Edge of push-up	Structure	Early Islamic
LC233.41	1	-	Structure	Early Islamic
LC233.48	1	-	Structure	Early Islamic
LC233.50	2	-	Structure	Early Islamic
LC233.57	1	-	Structure	Early Islamic
LC233.93	1	-	Artefact scatter	Early Islamic
LC233.108	1	-	Stone feature	?
LC233.109	1	-	Stone feature	?
LC233.118	1	-	Structure	Early Islamic
LC233.168	1	-	Stone feature	?
LC233.177	1	-	Stone feature	Sasanian? Early Islamic
TOTAL	36	-	-	-

FIG. 4.58. GLASS FROM THE MUGHAIRA SURVEY

4.4.2.2. The glass from the site survey

A total of 36 fragments (30.02 g., 4650 mm^2) of glass were collected during the survey of the Early Islamic settlement at Mughaira (Fig. 4.58). Three of these are recorded as originating from the general area of the site with no more precision given (LC226, LC227 and LC233). The remainder can be assigned to individual structural features. Eight fragments were found in the vicinity of building LC233.22, five at LC233.26, three at LC233.25, and two each at LC233.3 and LC233.50. The remaining 13 glass-producing features contributed just single fragments in each case. A total of 80.56% (29 fr., 14.28 g., 2625 mm^2) of the glass from the survey consist of undiagnostic body fragments. There is just one neck fragment, an example of *type C* from LC233.25. Five of the base fragments are 'push-ups'. Four are *edge of push*-ups, with one each from LC233.4 and LC233.22, and two from LC233.26, with the other of size *type 6* from LC233.2. The remaining base consists of an *applied pad base* from LC226. In terms of colour, four are too weathered for identification. Of the rest, 25 are of basic LGB glass, with five in EG glass and two in the OG group. None of the fragments from the Mughaira survey possess any decoration.

4.4.2.3. The glass from EX49

As noted above, 473 fragments (392.82 g., 75435 mm^2) of glass were excavated from in and around the large building explored by trench EX49 (Fig. 4.59). One of these was unstratified.

EX49	**Count**	**Weight (g.)**	**Surface Area (mm^2)**
Pre-building	55	50.81	10200
Central room	103	77.39	15525
Northeast room	54	28.13	7825
Southwest room	24	17.2	3400
Courtyard	220	212.93	36935
Structure 1	14	4.91	1200
Structure 8	2	1.2	275
Unstratified	1	0.25	75
Total	**473**	**392.82**	**75435**

FIG. 4.59. QUANTITY OF GLASS FROM THE LARGE BUILDING (EX49) AT MUGHAIRA

A total of 55 fragments of glass were recovered from the ‘pre-building’ contexts, with 42 of these from a deposit (774) situated under what was to become the northeast room. The remaining 13 fragments were distributed across deposits underlying the courtyard and central room (755=795)/(783).

The central room produced 103 fragments of glass. A small amount of glass, six fragments, was found in association with the room wall (751), with just four fragments excavated from the early floor level (752). The majority of the material was found in the main post-abandonment accumulation, with 44 fragments in (675) and five fragments in (726). The rest was associated with deposits having accumulated during a later subdivision and reuse of the central room, with 33 fragments associated with floor and deposits (667)/(649) and 11 fragments found within floor and deposits (724)/(670).

A total of 54 fragments were excavated from the northeast room. Of these, 23 were associated with the first floor level, overlying habitation deposit and related structural features (771)/(770)/(767). The post-occupation deposits (761)/(729) produced 28 fragments of glass, with the final three fragments originating in the overlying windblown surface sand (653).

The southwest room produced 24 fragments of glass. Almost all of these, 21 fragments, were found within wall collapse (650)/(664)/(655)/(773). Just two fragments could be associated with an intramural deposit (711), with the remaining fragment found in the overlying sand deposit (673).

The largest quantity of glass, 220 fragments altogether, comes from the extramural courtyard area. Of these, 108 fragments originate from the main courtyard deposits contemporary with the use of the structure (677)/(631), with a further three fragments associated with a burnt feature (704/705) and one more fragment found within a tannur oven (715) built within these deposits. To this we might add the 36 fragments from the deposits (668=734=723) which underlie a number of the outlying structures and are thought broadly contemporary with the main courtyard deposits. Of the remainder, 69 fragments were retrieved from the overlying windblown sand (629)/(630)/(632)/(754), with three fragments from within a section of wall collapse (775).

A small amount of glass was found associated with the outlying structures. Structure 1 produced 14 fragments. Three of these were associated either with a wall (636) or wall collapse (645), with eight from the main deposits (639)/(735). Two fragments were found within the cobbled surface (717) associated with the second phase of use of the structure, with the remaining fragment from the post-occupation deposits (642). Structure 6 produced no glass, while structure 8 offered just two fragment from the overlying sand (644).

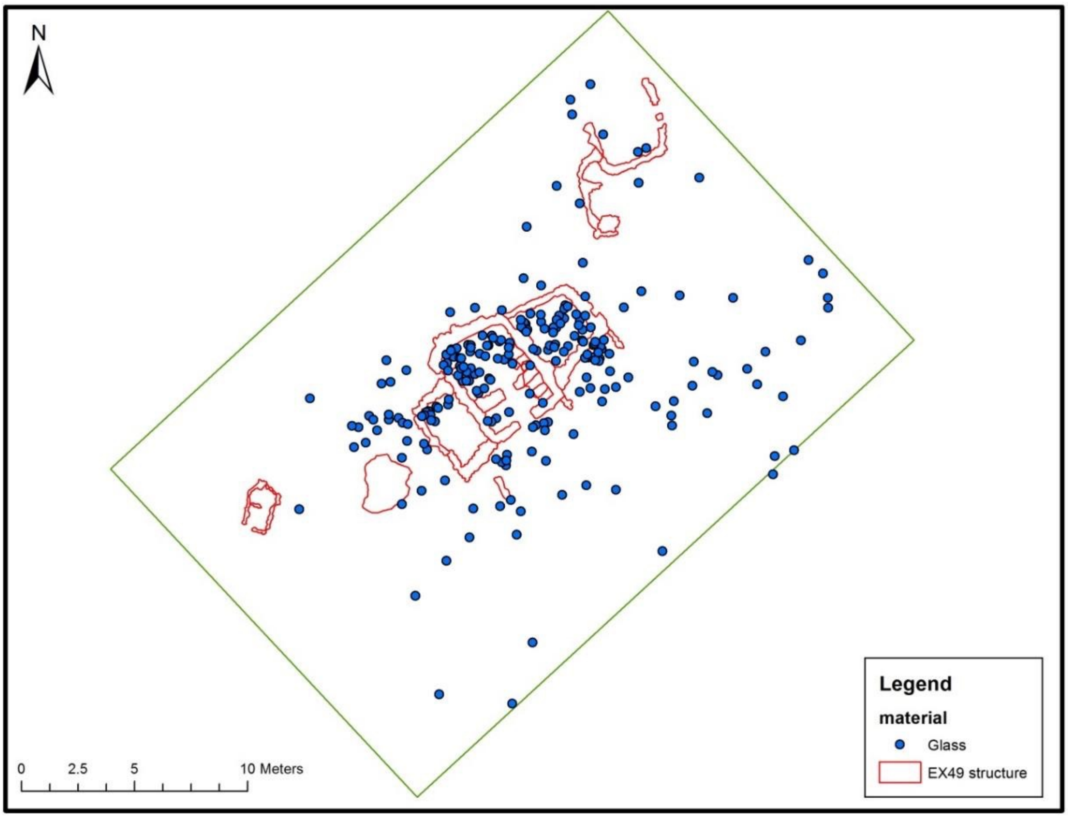


FIG. 4.60. PLAN OF EX49 SHOWING THE DISTRIBUTION OF GLASS

A basic distribution map of the excavated glass from EX49 shows that glass is more densely concentrated within the main structure, and in particular the central and north-eastern rooms (Fig. 4.60). In the central and south-western rooms the glass seems to increase in concentration towards the north-western walls, that is, away from the door-side, however this does not appear to be significant in the north-eastern room. Outside the building, there is a general spread of glass of much lower concentration. This is concentrated particularly outside the southeastern wall (door side) of the structure. This suggests that while the courtyard area produced more glass, this impression results from the fact that a wider area was excavated. For the most part, glass was an “inside commodity", its use predominately within the structure itself regardless of how much external activity was taking place.

Body fragments make up 81.61% (386 fr., 193.15 g., 48360 mm^2) of the assemblage from EX49, with 9.30% base (44 fr., 110.75 g., 15075 mm^2) and 9.09% rim and neck fragments (43 fr., 88.92 g., 12000 mm^2). The rim and necks include 29 'closed' and '14' open fragment forms.

CLOSED	No. Fragments	No. Vessels	Findspot
Folded and flattened rims	6	6	Pre-building (1); Central room (1); Courtyard (4)
Flaring necks (straight)	5	4	Pre-building (1); Northeast room (1); Courtyard (1); Structure (1)
Constricted neck	1	1	Southwest room (1)
Neck C	9	5	Courtyard (3); Northeast room (1); Pre-building (1)
Neck B	5	5	Pre-building (1); Courtyard (2); Northeast room (1); Southwest room (1)
Neck A	3	3	Courtyard (3)
TOTAL	29	24	

FIG. 4.61. CLOSED VESSEL TYPES IN EX49

The closed fragments can be divided into six diagnostic types (Fig. 4.61). Six fragments consist of *folded and flattened rims*, each of which represents a different vessel. One of these emerged from the pre-structural deposits (783), one from the central room (675) and four from the courtyard (629)/(631)/(734). Five fragments represent *flaring necks (straight)*, though this possibly equates to just four different vessels with two fragments showing close similarities. One such fragment originated in the pre-structural deposits (795), one from the northeast room (767), one from the courtyard (677) and two from structure 1 (645)/(717). The two fragments purported to belong to the same vessel (K-GL1844 and K-GL2045) were found across structure 1 and the northeast room. A single fragment of a rare type defined by a *constricted neck* was found among the wall collapse in the southwest room (650). The remaining closed fragments consist of partially diagnostic neck types. Nine fragments belong to neck *type C*, representing five original vessels, with six of these distributed in the courtyard (629)/(631)/(667), two in the northeast room (729), and one in the pre-occupation deposits (774). Five fragments are of neck *type B*, with one in the pre-occupational strata (729), two in the courtyard (631), one in the northeast room (729) and one in the southwest room (664). Finally, three fragments are of neck *type A*, all of which are found in the courtyard. Altogether, these fragment suggest an original number of 24 closed vessels associated with the large building. Although it is difficult to be certain that the partial neck fragments are not related to any of the rims, subjectively it seems unlikely that this is the case.

OPEN	No. Fragments	No. Vesssels	Findspot
Triangular-beaked rims	5	3	Courtyard/Southwest room (1); Courtyard (2)
Inwards-folded rims	4	4	Courtyard (2); Central room (1); Northeast room (1)
Plain rims (fine)	3	3	Courtyard (2); Southwest room (1)
Plain rims (thick)	2	2	Courtyard (20
TOTAL	14	12	-

FIG. 4.62. OPEN VESSELS FROM EX49

The open fragments have been organised into four types (Fig. 4.62). Most common are *triangular-beaked rims* with five fragments, though this amounts to just three original vessel as K-GL1677/1680/1856 all represent the same bowl. These three fragments were spread across the courtyard (723)/(677) and southwest room (664). The remaining two fragments also originated in the courtyard area (629). These are accompanied by four fragments with *inwards-folded rims*, all of which represent a unique vessel. Two of these were found in the courtyard (629)/(631), one in the central room (675) and one in the northeast room (767). Three fragments consist of *plain rims (fine)*, each from a different vessel, with two in the courtyard (629)/(723) and one in the southwest room (650). Finally, two fragments represent two vessels with *plain rims (thick)*, both originating in the courtyard (629)/(631). Altogether, this amounts to an original count of 12 open vessels associated with the large building.

Of the 44 base fragments, 43 are 'push-up' forms (Fig. 4.63). Of these, 30 were recorded as *edge of push-up bases*, with 23 from the courtyard (629)/(631)/(668)/(734)/(723)/(704/705), three from the southwest room (655)/(664), two from the northeast room (767) and two from the pre-occupation contexts (774). Of the remaining 'push-ups', one fragment of size *type 1* comes from the central room (675); of four fragments of size *type 2*, two come from the courtyard (631)/(734) and two from the pre-occupation contexts (774)/(795); four fragments of *type 3* are found across the pre-occupation deposits (795), the courtyard (631), the northeast room (729) and structure 8 (644); the two fragments of *type 5* were found in the pre-occupation strata (755) and the courtyard (631); finally, the two fragments of *type 6* were found in the courtyard (734) and central room (675). The remaining base fragment consists of an applied *pontil pad* found in the central room (675).

BASES	No. fragments	Findspot
Push-up 1	1	Central room (1)
Push-up 2	4	Pre-building (2); Courtyard (2)
Push-up 3	4	Pre-building (1); Courtyard (1); Northeast room (1); Structure 8 (1)
Push-up 5	2	Pre-building (1); Courtyard (1)
Push-up 6	2	Courtyard (1); Central room (1)
Edge of push-up	30	Pre-building (2); Courtyard (23); Southwest room (3); Northeast room (2)
Pontil pad	1	Central room (1)
TOTAL	44	-

FIG. 4.63. BASES FROM EX49.

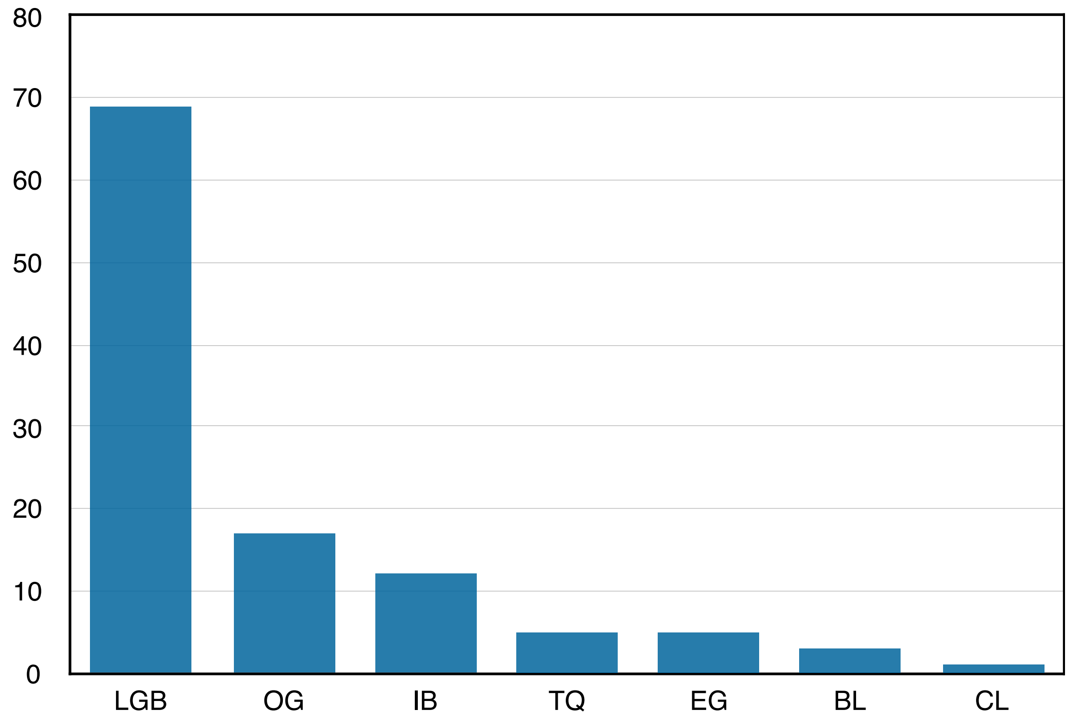


FIG. 4.64. GLASS COLOUR GROUPS FROM EX49

Six fragments possess some form of decoration. One of these consists of an otherwise undiagnostic body fragment with mould-blown *dimpled* decoration, found in the courtyard area (677). The remaining five all exhibit *trailed* decoration. One of these consists of a body fragment from the northeast room (771) with a thin thread *trailed* in a looped pattern. The others are neck fragments of *type C*, all of which seem to have originated from the same vessel however are spread across the pre-occupation deposits (774), the courtyard (631) and the northeast room (729). In terms of colour (Fig. 4.64), unfortunately most of the fragments (361 fr. 309.32 g., 60535 mm^2) possess considerable weathering crusts making identification difficult. Of the rest, 61.61% are of LGB glass (69 fr., 49.04 g., 9250 mm^2), followed by 15.18% OG glass (17 fr., 10.49 g., 2200 mm^2), 10.71% IB glass (12 fr., 6.62 g., 1725 mm^2), 4.46% TQ glass (5 fr., 2.38 g., 275 mm^2), 4.46% EG glass (5 fr., 8.7 g., 675 mm^2), 2.68% BL glass (3 fr., 4.99 g., 525 mm^2), and 0.89% CL glass (1 fr., 1.28 g., 250 mm^2).

4.4.2.4. The glass from EX50-53

The 83 fragments (92.19 g., 17375 mm^2) from the cliff-side complex can be divided among the different buildings explored by trenches EX50, EX52 and EX53 (Fig. 4.65).

	No. Fragments	**Weight (g.)**	**Surface Area (mm^2)**
EX50	36	51.7	8750
EX52	46	34.85	7775
EX53	1	5.64	850
TOTAL	**83**	**92.19**	**17375**

FIG. 4.65. DISTRIBUTION OF GLASS BETWEEN EX50-53

A total of 36 fragments (51.7 g., 8750 mm^2) were recovered from EX50 (Fig. 4.66, 4.67). Five of these originated in the pre-structural deposits (812)/(815). Seventeen fragments were found within the main room of the structure (809), with a further one fragment located within the annex (811). The extramural courtyard was host to 10 fragments of glass, seven in the main deposit (806) and three found within the fill of pit [844]/(838). The windblown sand overburden added another three fragments to the assemblage (805).

EX50	No. Fragments	Weight (g.)	Surface Area (mm²)
Pre-building	5	8.8	1725
Main room	17	18.25	3675
Annex	1	0.31	125
Courtyard	10	12.23	2000
Surface	3	12.11	1225
Total	**36**	**51.7**	**8750**

FIG. 4.66. GLASS FROM EX50

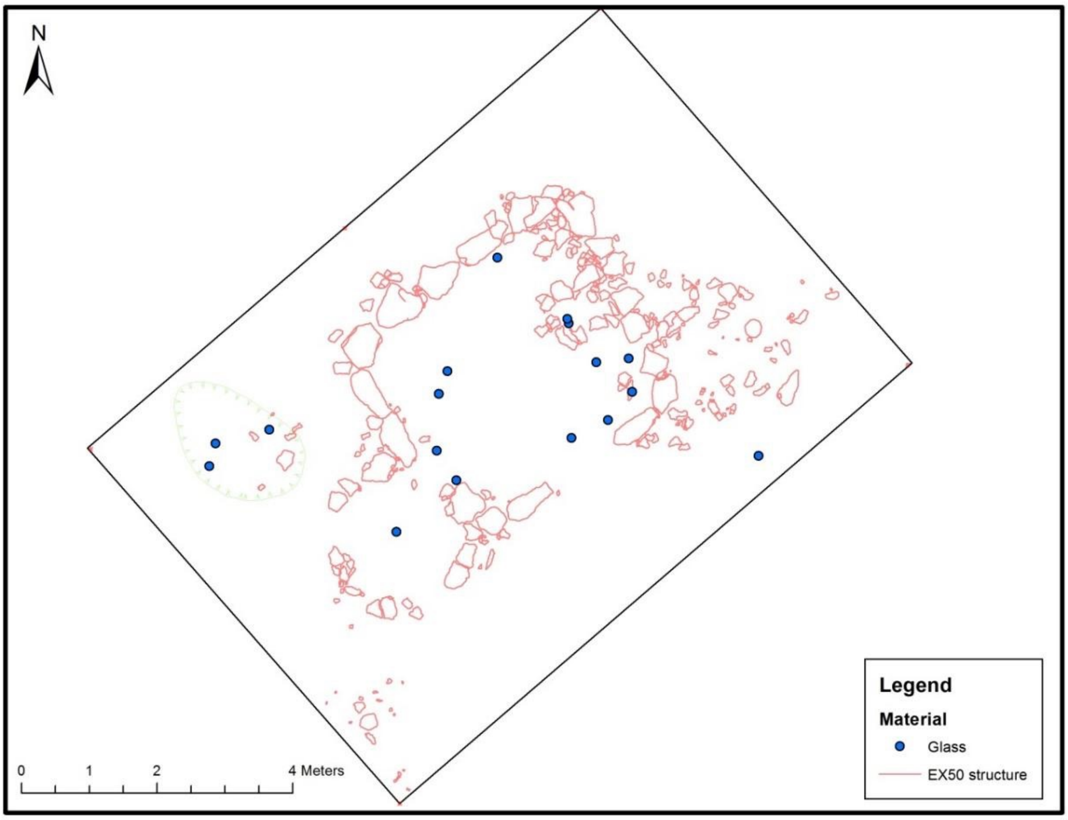


FIG. 4.67. PLAN OF EX50 SHOWING DISTRIBUTION OF GLASS.

At EX050 (Fig. 4.67), the distribution map of those fragments which possess spatial information reveals that glass is once again concentrated within the structure. Owing to the small numbers, there is little to say about the distribution other than that it appears concentrated in the main room, with only one fragment in the southwestern annexe. A number of the courtyard fragments can be seen in the pit to the west of the structure.

Forty-six fragments of glass (34.85 g., 7775 mm^2) originated within EX52 (Fig. 4.68, 4.69). Fifteen of these are associated with the packed surface (870), presumed to pre-date the occupation of the structure. Once erected, the main room of the structure was found to contain 11 fragments of glass (831)/(810), with a further three fragments in the adjoining annex (830). The extramural courtyard was again the scene of considerable activity, with seventeen fragments recorded from these deposits (808)/(850).

EX52	No. Fragments	Weight (g.)	Surface Area (mm^2)
Pre-building	15	7.91	1975
Main room	11	9.12	2574
Annex	3	2.09	475
Courtyard	17	15.73	2850
Total	**46**	**34.85**	**7775**

FIG. 4.68. GLASS FROM EX52

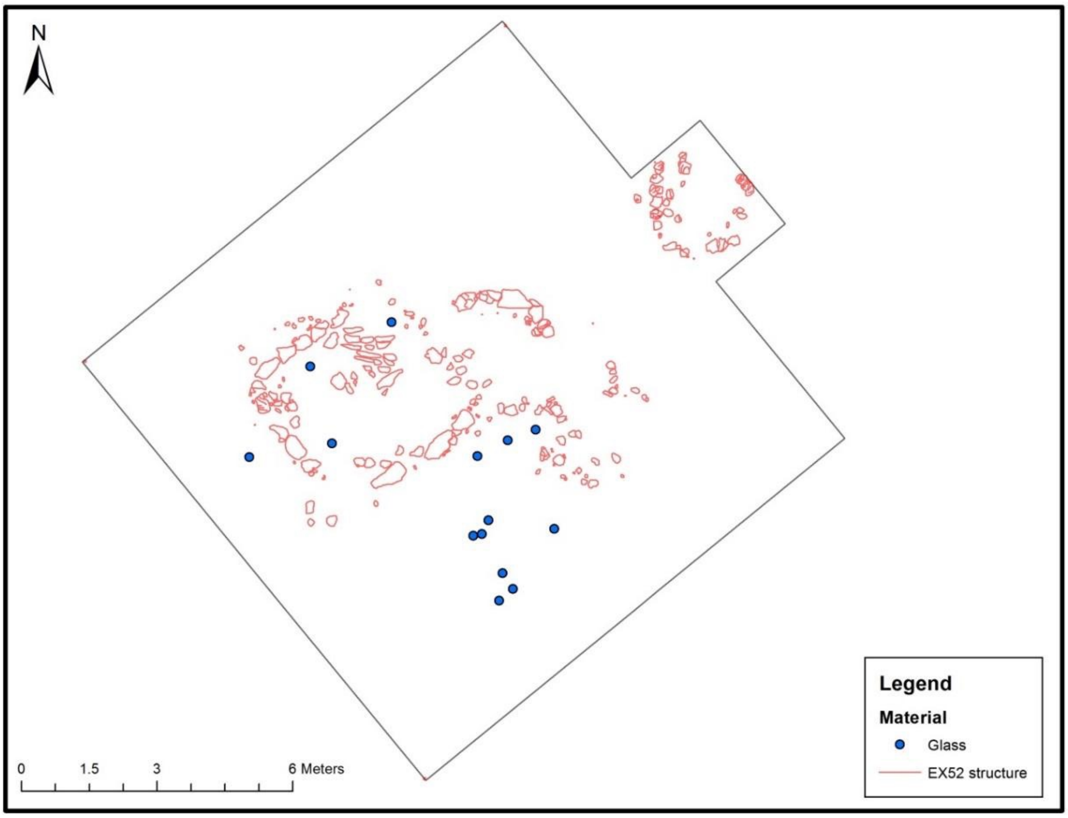


FIG. 4.69. PLAN OF EX52 SHOWING DISTRIBUTION OF GLASS.

Only a small quantity of the glass from EX052 has coordinate data, limiting the significance of the distributional analysis (Fig. 4.68). Slightly more was excavated outside the building, again outside the southeastern walls, however this picture is heavily biased as it was in this area where the main excavation outside the building took place. Excavation inside the building was however complete, and the lower quantity and proportion of glass from inside the structure is in stark contrast to the picture at EX049.

Just one piece of glass (5.64 g., 850 mm^2) was found in association with structure LC233.49, excavated by EX53 (Fig. 4.70). This was recovered from deposit (851), onto which the walls were built.

EX53	No. Fragments	Weight (g.)	Surface Area (mm^2)
Pre-building	1	5.64	850
Total	**1**	**5.64**	**850**

FIG. 4.70. GLASS FROM EX53

Again, most of the fragments, 79.52% (66 fr., 48.28 g., 11525 mm^2) are undiagnostic body sherds, with 9.13% bases (11 fr., 29.63 g., 4075 mm^2), 4.15% rims and necks (5 fr., 14.28 g., 1650 mm^2), and 1.20% (1 fr., 125 mm^2) miscellaneous fragments. The rims fragments consist of three 'closed' and two 'semi-open' forms.

CLOSED & SEMI-OPEN	No. fragments	No. Vessels	Findspot
Folded and flatted rim	1	1	EX50 Surface (1)
Flaring neck (rolled-in rim)	1	1	EX50 Courtyard (1)
Flaring neck (concave)	1	1	EX52 Courtyard (1)
Flaring neck (bevelled rims)	2	2	EX50 Surface (1); EX52 Courtyard (1)
TOTAL	5	5	-

FIG. 4.71. CLOSED AND SEMI-OPEN TYPES FROM EX50-53

The 'closed' fragments reveal three distinct types, each thus representing its own vessel (Fig. 4.71). These include a *folded and flattened rim* found in the surface sand (805) of EX50, a *flaring neck (rolled-in rim)* from the courtyard area (806) explored by the same trench, and an unusual *flaring neck (concave)* from the courtyard deposit (808) of EX52. Both 'semi-open' fragments consist of *flaring necks (bevelled rims)*, and may well belong to the same original vessel. That said, there are slight differences between the two fragments, to which we can add the fact that while one was found in the surface sand of trench EX50 (805), the other was within the courtyard deposits (808) of EX52. As such, a total of five original vessels from the cliff-side complex are suggested by the rim fragments.

BASES	No. fragments	Findspot
Push-up 1	1	EX52 pre-building (1)
Push-up 3	4	EX52 pre-building (1) and courtyard (2); EX53 pre-building (1)
Edge of push-up	5	EX50 main room (3); EX52 main room (1) and courtyard (1)
Pontil pad	1	EX50 courtyard (1)
TOTAL	11	-

FIG. 4.72. BASE FRAGMENTS FROM EX50-53

Ten of the eleven base fragments consist of 'push-up' forms (Fig. 4.72). Five of these are *edge of push-ups*, with three from the intramural deposits of the main room (809) in EX50 and two from EX52, including one fragment from the main room (810) and one from the courtyard (808). The other 'push-up' bases consist of one of size *type 1* from the pre-occupation deposits (870) of EX52, three of *type 3* from EX52 including two from the pit fill (838) and one from the pre-structural deposit (812), and a final example of *type 3* from the basic deposit of EX53 (851). The other base type consists of an applied *pontil pad*, found in a courtyard deposit (806) within trench EX50.

Although not strictly vessel glass, it is also worth mentioning a fragment of a glass rod found within a small stone feature (813) in the main room of building LC233.50 (EX50). This rod is best interpreted as a stirrer or implement for cosmetic application such as a 'kohl' stick - and may well have gone along with a small closed vessel used as a container for such commodities. Just one fragment from the cliff-side complex possesses any decoration. This consists of a *trailed* body fragment from the main room of structure LC233.50 (809), whereby a thin thread has been applied in a looped pattern. Most of the glass from this area is badly corroded (76 fr., 75.14 g., 15425 mm^2). Of the fragments where colour is identifiable, six fragments are of basic LGB glass (15.09 g., 1750 mm^2) with a single fragment of EG glass (1.96 g., 200 mm^2).

4.4.2.5. Interpreting the glass from Mughaira

Of the large quantity of glass from Mughaira, just 36 fragments (30.02 g., 4650 mm^2, 1 vessel) were collected during a relatively un-systematic survey of the site before commencement of formal study. The best insights into the use of glass by the inhabitants of the site thus come from the excavated material, of which there are 560 fragments (487.6 g., 93360 mm^2, 41 vessels). It is worth considering the relative quantities from the various features excavated within Mughaira.

A total of 473 fragments of glass (392.82 g., 75435 mm^2, 36 vessels) originated from the large building excavated by trench EX49. This compares with just 83 fragments (92.19 g., 17353 mm^2, 5 vessels) from the buildings of the cliff-side complex excavated by trenches EX50, EX52 and EX53, and four fragments (2.59 g., 550 mm^2, 0 vessels) from the minor trenches EX32 and EX36. Thus, whatever measure is used, between 80-90% of the glass originated in trench EX49 (Fig. 4.73). The small differences can be explained by different levels of fragmentation, the glass from EX49 being a little more fragmentary (0.83 g./fr., 159.48 mm^2/fr.) than that from EX50-53 (1.11 g./fr., 20.34 mm^2/fr.). Why this should be the case is not clear, but it is possible that the cliff-side location of the EX50-53 meant that this area was less disturbed.

	% Count	% Weight	% Surface Area	% Vessels
EX49	84.46	80.56	80.80	87.80
EX50-53	14.82	18.91	18.61	12.20
EX32 and EX36	0.71	0.53	0.59	-

FIG. 4.73. PROPORTIONS OF GLASS FROM THE DIFFERENT EXCAVATIONS AT MUGHAIRA

Of course these absolute figures aren't in themselves that meaningful, but require some further investigation. When it is considered that all the glass from EX49 relates to just one major structure (including its outlying courtyard and satellite buildings) while the glass from EX50-53 relate to three buildings, the difference in quantity between the two parts of the site becomes all the more dramatic. To put it another way, the 36 vessels from EX49 all appear to relate to the use of just one main structure, whereas the five vessels from EX50-53 relate to three less substantial structures. Although it is impossible to discount the impact of taphonomic processes on structuring the archaeological record, it seems reasonable to argue that glass was a very important part of the material life of those using the large building in EX49, and but a small part for those using the three buildings of EX50-53. Why might this be the case? The larger quantity of glass associated with EX49 matches the superior architectural status of the building. It thus seems reasonable to argue that this was a wealthier structure, better able to accommodate and afford large quantities of material culture. The question is whether the smaller quantity of glass associated with the structures of EX50-53 reflects a lack of ability or lack of desire on the part of its occupiers or users. It was argued, in relation to Area F, that the small quantity of surface glass there might suggest the presence of a semi-nomadic community that did not, for practical reasons, use much material culture in the course of their lives. This remains a problematic issue, to which there seems to be little hope of a definite answer based on the present information available.

It should be remembered that the survey of Mughaira identified many buildings besides those excavated. Although it is impossible to interpret the exact significance of all the features identified, particularly some of the more ephemeral remains, as an estimate there are 75 definite structures at Mughaira, most of the type similar to EX49. As such, should each buildings possess an archaeological assemblage of 36 vessels, this would amount to a total of 2664 vessels present at the site. Indeed, some of the structures seem more substantial than EX49, and this estimate does not include the more enigmatic 'stone features'. Clearly there are issues with this figure. The risks of extrapolating in such a way aside, there is also the problem of not knowing what proportion of the glass used at the site never made it into the archaeological record, having been taken away for recycling or 'lost', or whether this glass represents a cumulative figure or simply a snapshot of the material assemblage of the site at the time of its abandonment. However, it does at least give some idea of the total quantity which might have been present. Should the site have been occupied for between 100-150 years, this would require just 22.64 to 17.76 vessels per year of occupation to enter the archaeological record.

What then of the role of glass as suggested by the rim-defined vessel forms? For the 42 vessels identified from the survey and excavations at the site of Mughaira, 28 possess 'closed' forms, 12 'open' forms and two 'semi-open' forms. Already this suggests a mixed role for glass, rather than purely as a tableware. It has been seen how 36 of the 42 vessels originated in EX49, the trench which explored the large building. Of these, 24 represent closed forms and 12 open forms. As such, all the open forms from Mughaira originate in association with the large building.

Of the closed vessels, nine vessels consist of bottles with either *folded and flattened rims* or neck *type A*. It has been suggested throughout this thesis that these vessels might represent utilitarian storage bottles. It is interesting that seven of these nine were found in the extramural courtyard area associated with the large building. This might suggest that this function was fulfilled outside of the main building in this case. Nine vessels with *flaring necks (straight)* or the related neck *type B*, which may represent storage containers or equally vessels associated with serving, are found in a mix of contexts both inside and outside the building. The vessel with a *constricted neck* found in the southwest room is almost certainly a small toilet bottle, with the constriction serving to limit pouring and act as a basic seal. It is telling that just one such vessel is present in association with EX49, suggesting that 'personal' items such as this were not a common part of material life. The five vessels represented by neck *type C* include a range of profiles, at least one of which likely consists of a bottle with a long neck decorated with *trailed* threads.

The open vessels include a narrow selection of the standard range of types interpreted as basic tablewares associated with eating, drinking, presentation and display. The fact that all the open vessels found at Mughaira came from the large building already shows the differential role of glass in this context, as opposed to the cliff-side complex. Some of the open vessels were found in the courtyard, though in general they are more strongly associated with the building itself, found in a mix of the rooms. The base fragments add little to the interpretation of the role of glass in the building, being almost all push-ups in an even mix of sizes from large to small.

The five vessels found in association with the three structures excavated by EX50-53 consist of three closed and two semi-open forms. The closed types include the near ubiquitous *folded and flattened rim*, along with the more rarely seen *flaring neck (rolled-in rim)* and *flaring neck (concave)*. It could be argued that these latter small bottles represent personal items, toiletry containers or the like, used for cosmetics and precious liquids *et cetera*. Indeed, a small glass rod or *kohl stick* found in this part of the site may have been used in conjunction with one of them for the application of makeup. Interestingly, the two semi-open vessels consist of *flaring necks (bevelled rims)* that have been seen sparingly in the Kadhima region and interpreted as jars or 'carafe' like vessels associated with serving practices - something that sits awkwardly with the otherwise modest assemblage from EX50-53.

The practical role of glass at Mughaira can again be demonstrated by the sparse quantity of fragments with any decoration. Just 7 fragments, or 1.17% of the Mughaira assemblage by count, possess any decoration. Indeed, of these fragments, four trailed necks in EX49 seem to belong to the same vessel. In addition to these and another trailed fragment from EX50, the only other type of decoration present is a single mould-blown *dimpled* fragment. Yet again, this suggests that decorated glass was not a common feature in Early Islamic glass assemblages on a practical level. A similar impression of a modest assemblage is presented by the colour data. For EX49, 61.61% of the glass exhibits a natural LGB colour, followed by 15.18% OG. The higher quantity of IB glass than seen elsewhere on the coast with 10.70% is interesting, considering that colour may have a slightly later date range. Again deliberately coloured or decoloured glass makes up just a tiny percentage of the assemblage, indicating that like decoration, coloured glass was not that common in Early Islamic glass assemblages at sites like Mughaira.

4.4.3. The ‘Torpedo Jar’ sites

4.4.3.1. The archaeology

The so-called ‘torpedo jar’ sites were subject to unsystematic artefact collection and brief excavation (see §A.3.3). These sites consist of little more than scatters of torpedo jar ceramics along the shore, a distinctive type of storage and transport jar used throughout the region during the Sasanian and Early Islamic periods. It is suggested that these sites indicate maritime exchange with seasonally-present nomadic groups, perhaps with some connection to a fishing industry on the basis of the discovery of a net weight. Little dating evidence exists, however a yellow glazed sherd with a notched rim suggests a 5th-7th century date, thus placing this activity prior to the Early Islamic occupation of Mughaira.

4.4.3.2. The glass

A total of four fragments of glass (4.75 g., 825 mm^2) were recovered from the Subiyah ‘torpedo jar’ sites. Two of these originated from LC253, both undiagnostic body fragments of what is likely to be a modern glass. The two fragments from LC255 are more interesting. One consists of an *edge of push-up base* in LGB glass, whereas the other represents a bright TQ trail of glass, possibly once part of an *applied handle*.

4.4.3.3. Interpreting the glass from the ‘Torpedo Jar’ sites

The small quantity of glass from the ‘torpedo jar’ sites again suggests that glass was not a common part of material life in whatever activities led to the creation of these sites. The fact that two of the four fragments have been interpreted as of a modern metal further supports this scenario. That said, other than the torpedo jars themselves very little other material culture was found in association, barring a handful of sherds of glazed pottery and a proposed fishing weight. Interestingly, of the two archaeological fragments from these sites, one is of a bright TQ colour and probably represents the bottom part of a *trailed handle*. Having seen the rarity of such unusual pieces elsewhere in Kuwait, it is hard to believe that its presence here is a coincidence. It could be suggested, therefore, that while glass did not play any practical role in material life, what little material that did pass through would have been valued as a status symbol, and as such more likely to be elaborately coloured and decorated.

4.5. The Wadi al-Batin Region

The Wadi al-Batin was subject to two brief surveys which were limited to the southern, Kuwaiti side. These surveys considered two main sites: Bahra Hushan and Shiqaya.

FIG. 4.74. VIEW OF THE LOW MOUNDS OF BAHRA HUSHAN.

4.5.1. Bahra Hushan

4.5.1.1. The archaeology

Bahra Hushan consists of three low and wide mounds, c. 60-70 m diameter, each with ephemeral stone features, some fired brick, and significant quantities of artefactual material (see §.C.4.1; Fig. 4.1, 4.74). The surface structural features may represent reuse of the mound for squatter occupation or even burials. It is possible that these mounds represent large wells or cisterns, mounded settlement 'tells' not being a feature of this landscape. The artefactual evidence suggests a primarily 8th century date for these mounds.

4.5.1.2. The glass

Four fragments of glass were collected from Bahra Hushan. Three of these originated on the eastern mound (LC234), with the other on the western mound (LC236). Many more fragments of glass were identified at surface level, however these were left *in situ* owing to lack of time. The fragment from the western mound (LC236) belongs to a 'push-up' base of size *type L* in EG glass. Those from the eastern mound (LC234) consist of an undiagnostic body fragment in an unusual TQ metal, an open vessel with an *inwards-folded rim* in LGB glass, and an *edge of push-up base* again in LGB glass.

4.5.1.3. Interpreting the glass from Bahra Hushan

It is impossible to say much about the role of glass at Bahra Hushan owing to the summary nature of the surveys from which the assemblage originates, the small quantity of glass collected, and the fact that just one of the fragments can be linked to a vessel form - in this case an open vessel with an *inwards-folded rim*. It is however worth noting that this type is commonly seen in all the Kuwaiti sites and not unusual.

4.5.2. Shiqaya

4.5.2.1. The archaeology

Shiqaya represents a somewhat different settlement (Fig. 4.1, 4.75). The survey revealed a large structure, 30 x 15 m, with plastered walls arranged in a rectilinear, tripartite plan, surrounded by smaller structures, an industrial (brick-making) complex and at least two cisterns or wells (§A.4.2). A small part of the material assemblage consists of 'samara-horizon' wares dated to the mid-9th century, thus indicating a later occupation for this site than any of the other Early Islamic features discussed above. That said, most of the assemblage could conceivably date to the 8th century, while there is no evidence of 10th century occupation. This site has been interpreted as a way-station on the main route from Basra to the Hijaz, similar to those known from the Darb Zubayda, designed to facilitate the needs of pilgrims and other travellers.

FIG. 4.75. THE LARGE BUILDING AT SHIQAYA (IMAGE MEASURES 50 X 25 M)

4.5.2.2. The glass

Of 80 fragments (207.52 g., 27675 mm^2) collected from Shiqaya (LC292), the vast majority (76 fr., 192.05 g., 26757 mm^2) were from the vicinity of the large building (LC292.1), with just four (15.47 g., 1100 mm^2) from the area of the probable well (LC292.2) (Fig. 4.76). No further spatial resolution is available as to the distribution of the finds. It should be remembered that this represents a small sample of the material present at surface level conducted over a 30 minute period by a team of 15 people.

	No. Fragments	Weight (g.)	Surface Area (mm^2)
LC292.1	76	192.-5	26757
LC292.2	4	15.47	1100
LC292.3	-	-	-
TOTAL	80	207.52	27675

FIG. 4.76. QUANTITY OF GLASS FROM SHIQAYA

LC292.1

Regarding the material from the large building (LC292.1), 38 fragments (44.93 g., 8625 mm^2) represent undiagnostic body fragments (44.93 g, 8625 mm^2), with 25 bases (120.23 g, 14050 mm^2) and 13 neck and rim fragments (26.89 g, 3900 mm^2).

The rim and neck fragments consist of six 'closed' and seven 'open' forms. Regarding the closed vessels (Fig. 4.77), one fragment exhibits a *folded and flattened rim* while another belongs to the related neck *type A*. Other neck fragments include two of *type C*, a *ribbed neck (narrow)*, and a unique example of a *vertical neck (narrow)*. The open vessels include six fragments with *stepped rims* (Fig. 4.78), perhaps representing four different vessels, along with a sole fragment with a *plain rim (rounded)*.

CLOSED	**No. Fragments**	**No. Vessels**
Folded and flatted rims	1	1
Ribbed neck (narrow)	1	1
Vertical neck (narrow)	1	1
Neck A	1	1
Neck C	2	2
TOTAL	**6**	**6**

FIG. 4.77. CLOSED VESSELS FROM LC292.1

OPEN	**No. Fragments**	**No. Vessels**
Stepped rims	6	4
Plain rim (rounded)	1	1
TOTAL	**7**	**5**

FIG. 4.78. OPEN VESSELS FROM LC292.1

Of the 25 base fragments (Fig. 4.79), 21 are 'push-up' forms. Six of these are *edge of push-up bases*, with one of size *type 1*, five of *type 3*, two of *type 4*, five of *type 5* and two of *type 6*. Other base types include one *angular base*, one *pontil pad*, and two *flat to rounded* bases.

BASES	No. Fragments
Push-up 1	1
Push-up 3	5
Push-up 4	2
Push-up 5	5
Push-up 6	2
Edge of push-up	6
Angular base	1
Pontil pad	1
Flat to rounded bases	2
TOTAL	**25**

FIG. 4.79. BASE FRAGMENTS FROM LC292.1

In terms of colour (Fig. 4.80), 14 of the fragments are heavily weathered preventing reliable determination. Of the remainder, 30 fragments (69.31 g., 8800 mm^2) are of LGB glass, followed by 14 (69.51 g., 7825 mm^2) in the CL group, seven fragments (11.19 g., 1775 mm^2) of IB glass, seven fragments (15.17 g., 2275 mm^2) of OG glass, two (5.73 g., 650 mm^2) of TQ glass, one fragment (1.46 g., 200 mm^2) of EG glass and one fragment (2.2 g., 350 mm^2) with a modern metal. None of the fragments from LC292.1 exhibit any use of decorative techniques.

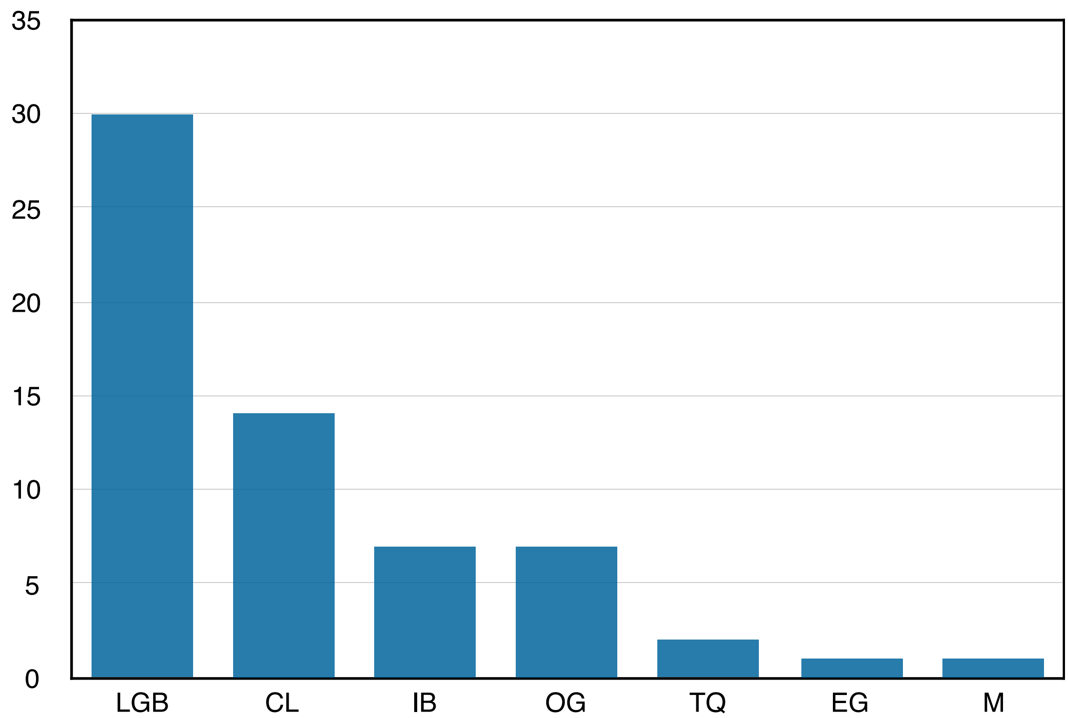


FIG. 4.80 COLOUR GROUPS FROM LC292.1

LC292.2

Of the four fragments from the area of the well (LC292.2) three represent base fragments (Fig. 4.81), including another *angular base* and two *edge of push-up bases*. The remaining fragment belongs to an undiagnostic body sherd. The *angular base* was produced in a CL glass, while one of the 'push-ups' was in an OG metal. The other two fragments consist of basic LGB glass.

BASES	No. Fragments
Angular base	1
Edge of push-ups	2
TOTAL	**2**

FIG. 4.81. BASE FRAGMENTS FROM LC292.2

LC292.3

No glass was recovered from the industrial area (LC292.3). The vitrified kiln lining seems to indicate that bricks were fired in this area, however it does not seem that glass or ceramics were produced here.

4.5.2.3. Interpreting the glass from Shiqaya

As the Shiqaya glass represents unsystematic survey material, it is difficult to say much about the significance of the quantity of glass at the site, or how it compares to the other sites explored by the Kadhima Project. Indeed, the methodological bias inherent in survey material can be demonstrated by the fact that the average weight and surface area of the fragments is quite high, for example, 2.59 g./fr. and 345.94 mm^2/fr., from Shiqaya, and 9.91 g./fr. and 606.25 mm^2/fr. from Bahra Hushan. That said, anecdotally speaking, glass was much more densely concentrated on the surface at Shiqaya than at Bahra Hushan, or indeed any of the Kadhima region sites. Any subsequent exploration of Shiqaya will have to bear in mind the fact that a substantial quantity of the surface material has been removed. Another point worth making is that the surface environment at Shiqaya is much less deflated than on the coast, having been exposed to less erosion and more sedimentation. As such, it is likely that the surface glass represents just a small portion of the glass contained in the archaeological deposits, unlike on the coast where much of the material was already exposed at surface level.

In terms of the role of glass, a small glimpse of what is possible is provided by the rim fragments. Eleven vessels could be identified in the Shiqaya glass based on the rim fragments. All of these were found in the vicinity of the palatial structure represented by LC 292.1, however as they are surface finds any association with this context must remain cautious. These rim-defined vessels suggest a different pattern of use seen to that in the Kadhima study region. Six represent closed vessels. Two of these closed vessels seem to be associated with storage, in the form of one vessel with a *folded and flattened rim* and one with a related neck *type A*. It is arguable that the remaining four closed vessels represent small toilet bottles or other similar containers. This interpretation seems quite valid for the vessels with the *ribbed neck (narrow)* and the *vertical neck (narrow)*, but is less certain for the two vessels with neck *type C*. The five open vessels include four small bowls with *stepped rims* similar to those commonly found on the coast, along with a bowl with a *plain rim (rounded)*. As such, the glass associated with the large building at Shiqaya seems mostly targeted at tablewares related to serving and consumption, as well as small personal bottles apt for containing toiletries and the like, with just a small number of more practical storage items. The base fragments too suggest some differences to the coastal study regions, with the *angular* and *flat to rounded* base types which are unique to Shiqaya

Before moving on to consider glass metal and decoration, it is worth noting that there are key similarities and differences in the range of vessels found at Shiqaya and in the coastal study regions. This attests to some overlap between the assemblages, but with other influences perhaps relating to context or chronology. The similarities include the open vessels with *stepped rims*, and the closed vessels with *folded and flattened rims* and *ribbed necks*. The rim-type differences amount to the single examples of an open vessel with a *plain rim (rounded)* and a closed vessel with a *vertical neck (narrow),* as well as the *angular* and *flat to rounded* base types. Altogether, the number of fragments of types unique to Shiqaya represent 14% of the diagnostic assemblage of bases and rims/

The same pattern of similarities and differences is evident in the range of metals seen at Shiqaya. In terms of colour, it seems to be the case that while the range of colours seen at Shiqaya is not dissimilar to the other Kuwaiti assemblages we have discussed above, there are greater proportions of colour groups rarely seen elsewhere. Looking at the Shiqaya assemblage as a whole, in terms of fragment count, ‘standard’ LGB types make up only 48.34% of the assemblage, compared to c.75% at Kadhima and 61% at Mughaira. Notably more common at Shiqaya are the IB (11.29%), OG (11.29%) and CL (22.58%) glass metals when corroded glass is excluded. That said, deliberately coloured types such as TQ glass are rare, whereas BL glass is conspicuous in its absence.

How can these patterns be explained? Four main (interrelated) possibilities seem to present themselves. The first is a matter of origins. It could be that the glass assemblage from Shiqaya originated in a greater number of different production sources to that of the coastal material, thus introducing a greater range of variation in metals, forms and types. Yet this is not an entirely satisfactory explanation as not only is there also considerable overlap in terms of rim and base types, but the bulk of the standard coloured LGB glass is indistinguishable from the coastal material on the basis of appearances meaning only the more unusually coloured glass would have to come from elsewhere. Indeed, not only are all the colour groups present at Shiqaya also present on the coast, but even more groups are found in the latter region. A more likely explanation relates to chronology, proceeding along the lines that as Shiqaya was occupied during a later period than the coastal sites, perhaps the range of types and colours available changed in this time. This is not in itself unlikely, as dramatic changes in ceramic styles are known to appear from the early 9th century after the so-called Samara Horizon, a large part of which saw an increase in the range and vibrancy of colours.

A particular candidate for chronologically later material are the *plain rim (rounded)*, *vertical neck (narrow)*, *angular base* and *flat to rounded base*, as well as the IB glass group, all of which are rare or nonexistent in the much larger coastal assemblages and likely early 9th century in date. In addition to chronology, context must also play an explanatory role. Shiqaya, although it remains unexcavated, appears to be of a different nature to the coastal sites (themselves different from one another). Owing to the size and architectural features of the large building and surrounding well, industrial and settlement complex, it seems not unreasonable to argue that Shiqaya was a much larger and wealthier site than those of Area ABC, E and F, while vastly different in function to Mughaira.

It might be expected that a wealthier site such as Shiqaya would possess a higher quantity of decorated glass as a proportion of the assemblage, working on the theory that decorated glass reflects value more so than colour. However, no decorated fragments were identified either at Shiqaya or at Bahra Hushan. As decorated glass can be shown to be a small portion of Early Islamic glass assemblages, perhaps the quantity of material recovered from Shiqaya was simply insufficient to demonstrate this.

4.6. Chapter Summary

The purpose of Chapter Four has been to present and analyse the data pertaining to the glass assemblages from several 'Early Islamic' sites in Kuwait, particularly those in the Kadhima region and at Mughaira. As such, the structure and contents of Chapter Four were mostly directed at the aim of assessing the practical and social function of vessel glass at these sites, as established in Chapters One and Two. The analysis of function benefited from the predicted insights made in this regard in Chapter Three, as summarised in figure 3.94 at the end of that chapter. This was contextualised against the archaeological data collected by the Kadhima Project, as summarised above and presented in more detail in Appendix A. The results from Chapter Four, summarised at the end of the relevant sections above, are discussed in significant detail in Chapter Six. The key issues discussed include the implications of the Kuwaiti sites for the chronology of the glass typology, how the practical and social function of glass differs between the Kuwaiti sites, and how this compares with the results from Unguja Ukuu and beyond. By way of summary, the main outcomes from this chapter are that vessel glass can be seen to play a variety of roles in the different socio-economic and functional contexts discussed above - even between sites that are seemingly contemporary and in close geographic proximity. Glass is also present in vastly different quantities in different contexts, presumably reflecting different levels of access to and appreciation for material culture. Finally, the glass assemblage is quite limited in its range of types - yet still manages to fulfil a wide range of functions owing to the different proportions in which certain types are present. This has implications for how the nature of non-elite vessel glass assemblages dating to the Early Islamic period should be understood. The next chapter, Chapter Five, presents and analyses the glass from Unguja Ukuu.

Chapter Five
The Glass from Unguja Ukuu

Chapter Five turns its attention to the glass from the ancient Zanzibari capital of Unguja Ukuu, the island emporium which linked the East African coast with the Indian Ocean. In spite of the early discovery of the site, archaeologists and historians have been guilty of failing to appreciate the importance of Unguja Ukuu in regard to the increasing levels of socio-economic complexity seen in the region in the second half of the 1st millennium AD, as well as the site's importance to the development of East African-Indian Ocean trade. Yet today, following recent excavations conducted by the Sealinks Project among others, Unguja Ukuu is finally attaining the prominent position in East African history that it deserves. This chapter introduces the site of Unguja Ukuu, before exploring the glass assemblages produced by the Sealinks Project. It ends with an extensive interpretation of the data and analysis from the site as a whole.

5.1. Introduction to Unguja Ukuu

5.1.1. Geography

Unguja Ukuu is located on Unguja Island which, measuring 87 km north to south and c. 1660 km^2, is the largest of the islands in the Zanzibar archipelago (Fig. 5.1). It is located in the southern tropics at around 6 degrees south, and at its nearest lies only 35 km from the Tanzanian mainland (Juma 2004: 41). Unguja Ukuu itself is located in a sheltered area on the southwest of the Island, in a coastal environment characterised by a combination of sandy beaches, mangrove swamps and coral limestone landscapes (Juma 2004: 42). The archaeological remains are mostly found behind the beach, sheltered by the Makime headland and a mangrove-lined channel (Juma 2004: 56).

The favourable location of both island and site means that Unguja Ukuu is aptly placed to act as a gateway between this part of the East African mainland and the wider Indian Ocean, as well as a node on a coastal communication network. The seasonal alternations of the monsoon winds, driven by the annual migration of the Inter-Tropical Convergence Zone, and their impact on the East African Coastal Current, easily facilitate maritime interactions along this coast (see McClanahan 1988; Richmond 1997; Kleppe 2007). Furthermore, they make possible relatively quick and safe passages between East Africa, Arabia and the Persian Gulf, as well as direct across the Indian Ocean to southern India and beyond. These geographic factors helped to underpin the site's success in the late 1st millennium AD.

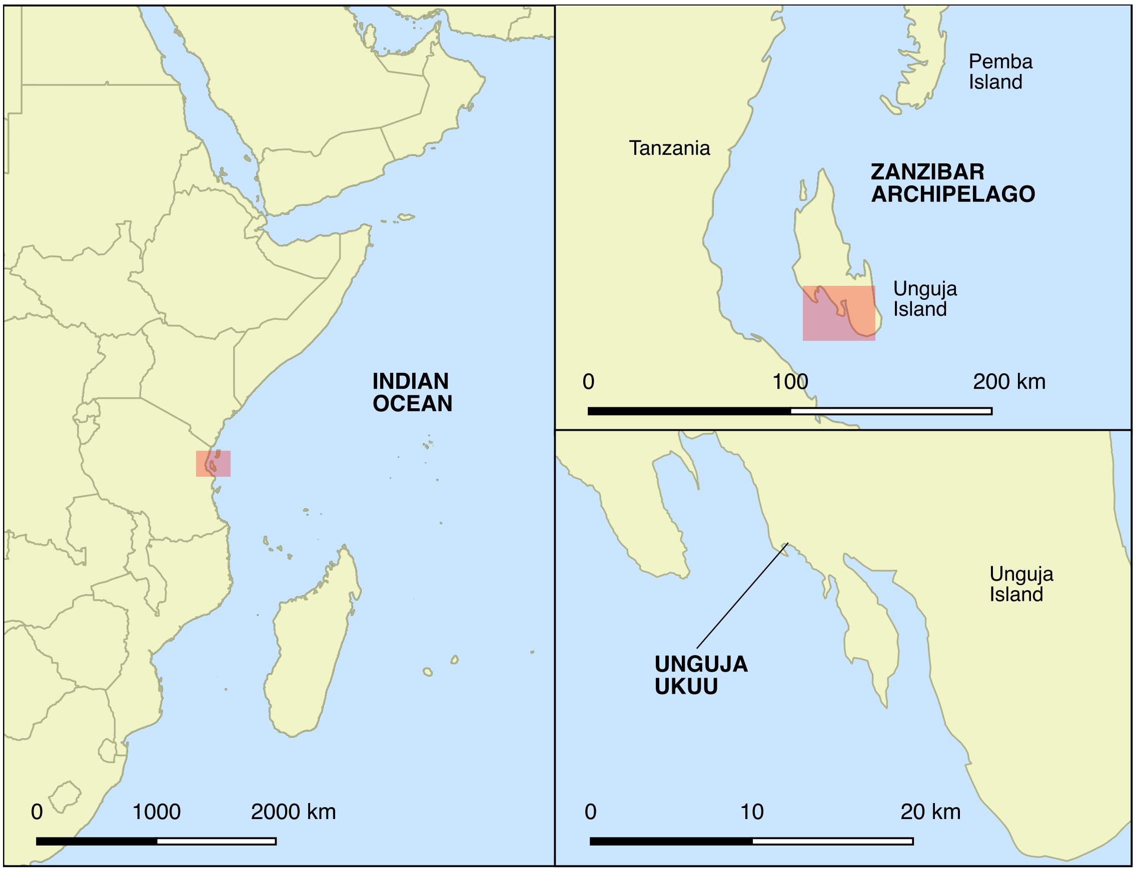


FIG. 5.1: LOCATION OF UNGUJA UKUU

5.1.2. Historical significance

Today Unguja Ukuu is recognised as a vibrant trading emporium occupied in the second half of the 1st millennium AD. While the chronological origins of the site may remain a matter of dispute, it is clear that by the late 7th or early 8th century AD Unguja Ukuu was a thriving proto-urban community with its eyes turned outwards to the Indian Ocean. Unguja Ukuu reached the peak of its prosperity in the 9th century AD. At this time the proportion of the ceramic assemblage which was imported from outside East Africa is estimated at around 9%, a figure more than double those seen at contemporary sites within the region (Horton n.d.). Echoing these external influences, many of the resident population seem to have been followers of Islam. Yet for some reason, as yet unknown, Unguja Ukuu could not maintain its early prosperity and was more or less abandoned by the end of the 10th century AD. The successful trajectories enjoyed by its contemporaries in the early 2nd millennium AD were not replicated at

Unguja Ukuu; there was to be no florescence into a fully urban stone town such as those typical of the Swahili coast. Indeed, its place in the collective memory was all but forgotten. While the ruins remained, by the early 20th century the site held no significant place in local historical traditions (Ingrams 1931 [1967]: 136).

5.1.3. Previous research

The relatively early decline of the settlement of Unguja Ukuu and its failure to leave much in the way of upstanding architectural remains (in contrast to many of the other medieval towns of the East African coast) is surely the source of the slow start to archaeological research at the site. Yet while Unguja Ukuu boasts little in the way of visible remains and seems to have held no place in local traditions, it would be wrong to say that the site had been lost during the course of the 2nd millennium AD. On the one hand, the existence of an important site survived in Arab historical texts. The 8th-9th century AD author al-Jahiz uses the toponym L'Unjuya to refer to the site, and the 12th-13th century AD historians Idris and Yaqut use a similar term to refer to the entirety of Unguja Island (Juma 2004: 19; Trimingham 1975: 125-6). Of course only the former of these is a contemporary account, and little is learnt about the significance of the site from toponyms - other than to say that some authors thought it worthy of a mention. In terms of physical remains, the presence of a site was certainly evident from the mid-19th century. The journals of Dr. Livingstone, who visited Unguja Island in 1866, document the discovery of some coins which were found at Unguja Ukuu a year earlier (Livingstone 1874: 7-8). These were later identified as Abbasid gold dinars, one of which bore a date of 182 H, that is AD 798-9 (Chittick 1966: 163). It is said that their discovery precipitated a spate of digging at the site in the hope of upturning more treasures - though apparently this was to no avail (Pearce 1920: 417-8). If true, this must have led to considerable disturbance of the upper layers of the archaeological remains.

Archaeological study of the site began in the early 20th century with the visit of F.B. Pearce, who noted the presence of "…numerous fragments of Arabian and Syrian glass, pieces of glazed and coloured pottery, and some beads…" along the foreshore (Pearce 1920: 417). Pearce gave a bleak description of the paltry surface remains, noting only "…one or two possible vestiges…", and it is thus unsurprising that little attention was paid to the site in subsequent decades (Pearce 1920: 417). Indeed it was not until the 1960s and the arrival of Neville Chittick under the auspices of the newly-founded BIEA that Unguja Ukuu was brought to the attention of the mainstream archaeological community (Chittick 1966). Chittick himself lamented the disparity between the obvious significance of the site and the paltry quantity of research that had been conducted (Chittick 1966: 161). His identification of turquoise-glazed 'Sasanian-Islamic' and Chinese stoneware ceramics at Unguja Ukuu, at the time only known in tiny numbers on the East African coast, demonstrated a late 1st millennium AD occupation with links to the wider Indian Ocean world (Chittick 1966: 161-2). Furthermore, Chittick was right in suggesting that Unguja Ukuu was not occupied into the 2nd millennium AD, owing to the absence of 'white tin-glazed' and 'sgraffiato' wares (Chittick 1966: 163). Yet, in spite of his recognition of the site's obvious significance, the dearth of upstanding remains seems to have dissuaded Chittick from conducting further research at Unguja Ukuu, his head turned by the more visually dramatic stone towns elsewhere.

Unguja Ukuu remained unexplored for another two decades, until its inclusion in a formal survey of the pre-19th century sites of Unguja and Pemba Islands by Mark Horton and Cathy Clark (Horton & Clark 1985, based on a list compiled from earlier work by Pearce 1920, Ingrams 1931, Buchanan 1932 and Kirkman 1964). The survey covered a total of 58 sites on the two islands, though Unguja Ukuu was perhaps the most extensively studied. The work included artefact collections, mapping of the cultural remains, the production of a basic topographic map, and the excavation of several small test pits, one of which reached more than 2 m in depth (Horton & Clark 1985: 167). A decade later, Abdurahman Juma was able to use these date to inform his own research strategy. Juma's study of Unguja Ukuu formed the basis of his doctoral thesis on the theme of the development of urbanism on the East African coast, and involved an extensive site survey and multiple seasons of excavations (Juma 1996; Juma 2004). His survey involved a battery of techniques, including field-walking, drilling, phosphate testing, mapping and geophysical survey, including magnetometry and resistivity (Juma 2004: 55). The excavations were substantial, consisting of test pits which altogether covered an area of 24 m^2/222 m^3, as well as shallow, broad excavations over a much larger area 410 m^2/11,500 m^3 (Juma 2004: 82-3).

The picture which has emerged reveals Unguja Ukuu as a reasonably large town of 17.2 ha at its peak in the 9th century AD. The dates of occupation remain hazy, particularly regarding the site's foundation. Juma has argued for a foundation date of AD 500, based on several unreliable C-14 dates and the dubious identification of certain ceramic wares. Indeed, a later origin in the 7th or even 8th century would seem a better fit for the existing artefactual data, as well as correlate more closely with the picture seen elsewhere on the East African coast. The decline of the site appears less controversial. The 9th century AD peak in prosperity was followed by a precipitous decline in the 10th century AD and the site's more-or-less total abandonment, with the exception of some informal residual occupation and post-medieval burials. In terms of the nature of the occupation, the majority of the built environment would have consisted of mud-timber structures, while Juma also discovered rubbish pits and hearths. Only a small number of stone buildings were identified, which Juma dates to no earlier than AD 900 - the later part of the site's occupation.

Little is known about life at Unguja Ukuu, who its inhabitants were, or what they did that made them so prosperous. A model based on the above evidence might suggest that the site was settled by a predominately indigenous East African population, emerging from the nascent TIW communities which sprung up along the coast from the 6th century AD. Unguja Ukuu seems to have been favoured partly owing to its sheltered location and good links to the mainland coastline and wider Indian Ocean. While the inhabitants undoubtedly conducted some subsistence activities exploiting the surrounding resources, most of their prosperity came from acting as middle-men between the Indian Ocean traders and the East African interior. Basic craft and marine products would have been exchanged with the inhabitants of the mainland in return for natural commodities, even slaves, which were in great demand in the population centres of the Perso-Arab lands (Horton 1996b: 414-416). Thus, East African products were subsequently exchanged for imported goods, of which the most durable are currency, ceramics and glass. Other, less durable items were undoubtedly imported, perhaps textiles, foodstuffs, precious oils and perfumes, other toiletries, medicines and spices.

This triangular economy was particularly profitable for Unguja Ukuu, and allowed the community to prosper and also distinguish itself more and more from the East African interior. One means of distinction was undoubtedly material, and it is thus that the contrast between the abundance of 'Islamic' and 'Chinese' artefacts found at the coastal emporia and their near total absence in the African interior should be understood. Another means was through the adoption of less tangible aspects of non-local culture, notably the Arab religion of Islam. It is no coincidence that Islam, like the imported physical objects, was also confined to the coastal region at this time.

The demise of Unguja Ukuu is something that cannot be presently explained. It might have been in response to environmental factors as the marine environment had a habit of transgressing on the inhabited space, as noted below. It might have been due to a breakdown in the triangular economy suggested above, though how exactly this took place is not certain. Perhaps the supply of, or demand for, East African commodities dried up, or a trading partner suffered from its own decline. Indeed, we know that a major reorientation of trade between the Persian Gulf and the rest of the Indian Ocean took place at some point in the 10th century AD, following a combination of factors including the destruction of the important trading port of Siraf following an earthquake in 978 AD, and the restructuring of long-distance trade - with journeys being broken down into shorter, more efficient journeys, and a shift in focus towards Kish, closer to the junction of the Gulf and the Arabian Sea (Whitcomb 2009: 78). Whatever happened, it was something that appears to have been fatal for Unguja Ukuu, yet does not appear to have much trace at the contemporary East African towns.

5.1.4. The Sealinks Project

The Sealinks Project was established with the wider aims of investigating early seafaring and long-distance connections between pre- and early historic communities occupying the Indian Ocean rim. At Unguja Ukuu, the project's specific aims and objectives were focused on identifying evidence for the early phases of occupation of the Zanzibar archipelago, as well as to establish the nature of the societies that lived there, and their wider connections with the East African coast and the Indian Ocean world. There is a strong scientific emphasis to their research strategy, particularly with regard to archaeobotanical, zooarchaeological and palaeoenvironmental data.

The Sealinks Project excavated a total of six trenches. Each trench was assigned a consecutive number starting from 10, prefixed with UU. Trenches were a minimum of 2 x 1 m in area, though below 1.5 m depth they were stepped at 1 m intervals. The excavations were conducted stratigraphically according to the single context method, though some deeper contexts were excavated in smaller spits of 0.10-0.20 m to aid stratigraphic control. Each context was assigned a three-digit number, unique within each trench, and spits were given consecutive letters. Crucially, all deposits were either wet or dry-sieved on site using a 3 mm mesh. All artefacts were collected and bagged. Subsequently, the glass was exported to the UK for further analysis and then transferred to Durham for study. The glass from each of these trenches is discussed in turn below. The details relating to this fieldwork are available in Appendix B.

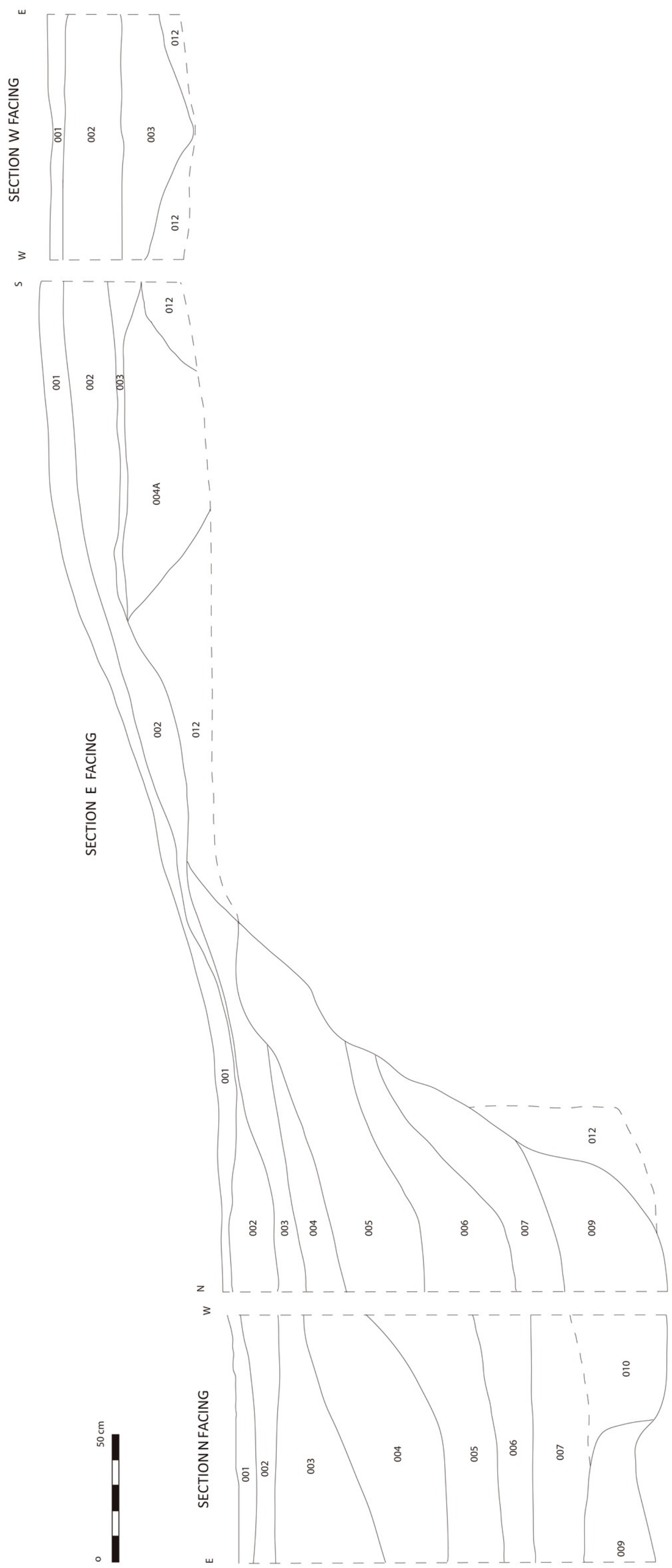


FIG. 5.2: SECTION OF TRENCH UU10 (SEALINKS PROJECT 2011)

5.2. Glass from the Sealinks Project

5.2.1. Trench UU10

5.2.1.1. The archaeology

Trench UU10 (see §B.1.1), 4 x 1 m in extent, was located to the south of the site on the edge of a small mound, positioned with the ocean to the west and the Uzi channel to the east. The area to the south had been levelled by the military, possibly removing part of the deposits excavated by Horton in the 1980s. The total volume of deposits excavated is estimated at 2.6 m^3. By way of interpretation it would appear that trench UU10 did not explore an area of habitation, with two pits (A and B) instead suggesting waste disposal activities located on the edge of the main occupation - a practice supported by the high density of artefactual material located within (Fig. 5.2). Although this part of the site is mounded, the shallow depth of stratigraphy reveals this to be a natural phenomenon. The ceramic evidence suggests the pits date to the 8th-9th century AD with the sealing layers which overlie them dated to the 9th-10th century AD.

UU10	Contexts	No. Fragments	Weight (g)	Surface Area (mm^2)
Top-soil and sub-soil	**001**	29	13.29	4475
	002	7	6.07	1825
Sealing layer/Pit A	**003**	36	35.09	5575
Pit B	**004**	62	67.80	9930
	005	35	27.62	6880
	006	44	33.37	8650
	007	19	18.02	4550
	008	6	1.44	540
	009	54	25.58	7485
	TOTAL	**292**	**228.28**	**49910**

FIG. 5.3: QUANTITY OF GLASS FROM TRENCH UU10

5.2.1.2. The glass

A total of 292 fragments of glass were recovered from UU10 (228.28 g., 49,910 mm^2), not including two fragments found at surface level. This glass is present in considerable quantities throughout the sequence, with the exception of the sterile clay (012). The vast majority, 220 fragments in total (173.83 g., 38, 035 mm^2), were recovered from Pit B (004-009). Although data regarding the volume of each context is not available for UU10, the glass seems more or less evenly distributed throughout Pit B, with smaller quantities in contexts (007) and (008). The presence of glass in the upper layers (001), (002) and (003) is not surprising considering the extent to which the site has been disturbed.

The majority of the glass fragments, 256 altogether (169.48 g., 39,950 mm^2) are body sherds which are undiagnostic of vessel form. Unsurprisingly, the distribution of these within the sequence determines that of the UU10 assemblage as a whole. Otherwise, it is difficult to extract any further information from the body sherds themselves. The rest of the assemblage can be broken down into 22 rim fragments (15.58 g., 4,395 mm^2), 10 base fragments (41.43 g., 5,025 mm^2) and 4 miscellaneous fragments (1.79 g., 540 mm^2). Of the 22 diagnostic rim and neck fragments of glass in UU10, 17 can be described as open vessel forms (10.38 g., 3495 mm^2), with four closed fragments (4.46 g., 700 mm^2) and one semi-open fragment (0.74 g., 200 mm^2). This seems to equate to a minimum of 16 unique vessels.

	No. Fragments	**No. Vesssels**	**Findspot**
Plain rims (rounded)	7	7	001 (1); 004 (2); 006 (2); 008 (1); 009 (1)
Stepped rims	4	3	002 (1); 003 (1); 005 (1)
Plain rims (fine)	4	1	003, 004 and 008 (1)
Inwards-folded rim	2	1	006 (1)
TOTAL	17	12	-

FIG. 5.4: OPEN RIM TYPES FROM TRENCH UU10

Regarding the 17 fragments belonging to open vessels, the majority are found in the upper layers of Pit B (Fig. 5.4). These 17 fragments suggest an estimate of just 12 unique vessels. Broken down by type, we can see how seven vessels belong to open vessels with *plain rims (rounded)*, three vessels with *stepped rims*, one with a *plain rim (fine)*, and one with an *inwards-folded rim* in an irregular 'wave' pattern. These types are distributed throughout the sequence, each with at least one fragment found within Pit B and generally smaller numbers within disturbed upper strata. Some mixing of strata is evident, with the three fragments making up the single vessel with the *plain (thin) rim* (U-GL46/92/226) found in contexts (003), (004) and (008) respectively.

The five closed and semi-open fragments seemingly evidence four unique vessels (Fig. 5.5), with two fragments (U-GL86/272) representing a single vessel. The closed vessels are represented by a *folded and flattened rim* (U-GL86/272), and two small, delicate flasks, one with a *flaring (bulging) neck* (U-GL212) and the other with a *ribbed neck (narrow)* (U-GL150). The semi-open vessel (U-GL143) probably represents a large jug with a *vertical neck (wide)*. All five of the closed and semi-open fragments are distributed throughout Pit B. Again some mixing is evident within Pit B, with the two fragments belonging to the single vessel with the *folded and flattened rim* (U-GL86/272) found some distance apart stratigraphically, in contexts (004) and (009). Otherwise the vessels with the *ribbed neck (narrow)* and the *vertical neck (wide)* are found in context (005), and the delicate bottle with the *flaring (bulging) neck* is found in context (007).

CLOSED & SEMI-OPEN	No. Fragments	No. Vesssels	Findspot
Folded and flattened rim	2	1	004 and 009 (1)
Flaring neck (bulging)	1	1	007 (1)
Ribbed neck (narrow)	1	1	005 (1)
Vertical neck (wide)	1	1	005 (1)
TOTAL	5	4	-

FIG. 5.5: CLOSED AND SEMI-OPEN RIM TYPES FROM TRENCH UU10

A total of 10 base fragments were identified in UU10 (Fig. 5.6). As to be expected, the bases are predominately of the ‘push-up’ variety, with seven such fragments. Two of these (U-GL192 and U-GL252) are in size-category *push-up 3*, while the other five are designated as *edge of push-ups*. The remaining bases include two *flat to rounded bases* (U-GL34 and U-GL66), and a *folded ring base* (U-GL280). The ‘push-up’ bases are all found in Pit B, with the *push-up 3* fragments in (006) and (009), and the *edges* in (004), (005) and (006). One of the two *flat to rounded* fragments (U-GL34) appears to be residual, being found in the modern sub-soil (002), while the other is in the more familiar findspot of Pit B (006). The *folded ring base* is found at the bottom of Pit B (009).

BASES	No. Fragments	Findspot
Push-up 3	2	006 (1); 009 (1)
Edge of push-up	5	004 (2); 005 (1); 006 (2)
Flat to rounded bases	2	002 (1); 006 (1)
Folded ring base	1	009 (1)
TOTAL	10	

FIG. 5.6: BASE FRAGMENTS FROM TRENCH UU10

Four fragments have been recorded as 'miscellaneous' (Fig. 5.7). These include two *internal body folds* (U-GL161 and U-GL281), both belonging to open vessel forms, and each in the same style. That said, they are clearly from distinct vessels owing to size discrepancies between the two. These are both from Pit B (005) and (009). The remaining two miscellaneous fragments (U-GL201 and U-GL203) are threads of glass which represent *applied trail decoration* that has subsequently broken off the main vessel, one in a looped pattern and the other in a triangular pattern. Both are from Pit B, and although from different contexts, (006) and (007) respectively, may well have been affixed to the same vessel.

MISC.	No. Fragments	Findspot
Trails	2	006 (1); 007 (1)
Internal body folds	2	005 (1); 009 (1)
TOTAL	4	

FIG. 5.7: MISCELLANEOUS FRAGMENTS FROM TRENCH UU10

In addition to these two examples of trailed decoration, another fragment boasts the much more rare technique of *scratch-engraved decoration* (U-GL90). This small fragment of cobalt blue coloured glass was found in the upper part of the Pit B sequence (004). None of the other fragments appear to have any decoration.

The range of colour groups revealed in UU10 shows LGB glass to be dominant with 44.86% (131 fr., 126.51 g., 22895 mm^2), followed by a strong showing for IB glass (36.54%, 107 fr., 74.24 g., 19450 mm^2), with the CL (11.64%, 34 fr., 18.49 g., 5190 mm^2), OG (4.79%, 14 fr., 7.01 g., 1835 mm^2), BL (1.03%, 3 fr., 0.92 g., 335 mm^2), EG

(0.34%, 1 fr., 0.65 g., 75 mm^2), COR (0.34%, 1 fr., 0.37 g., 100 mm^2) and unclassifiable (0.34%, 1 fr., 0.09 g., 30 mm^2) groups making up the remainder (Fig. 5.8).

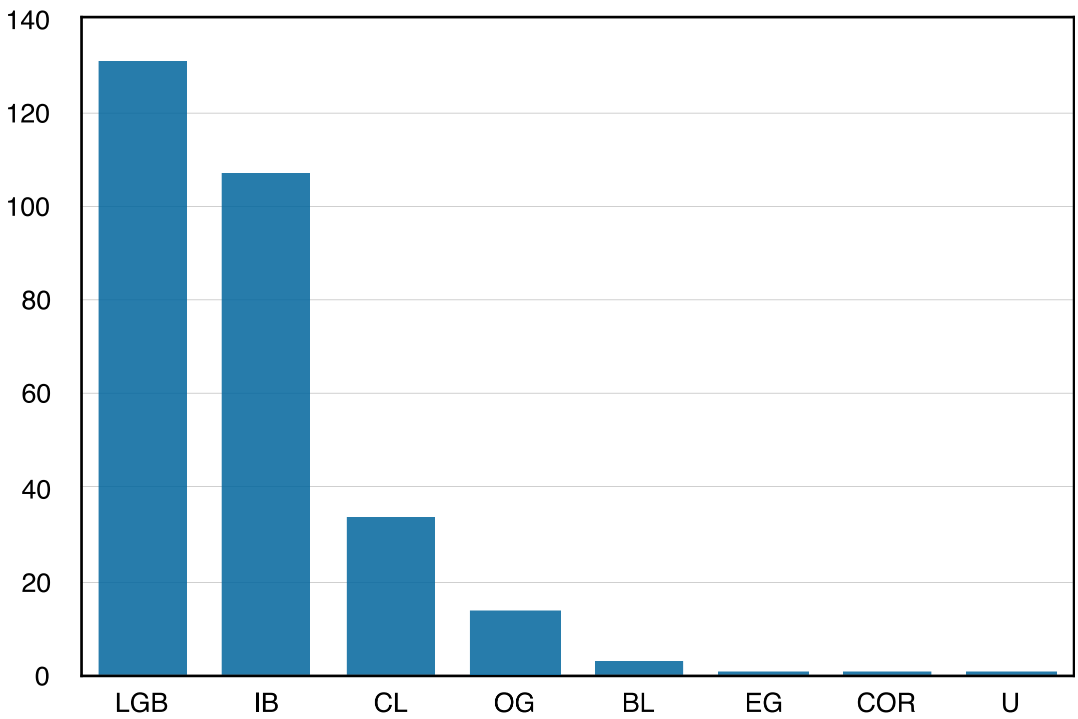


FIG. 5.8: COLOUR GROUPS FROM TRENCH UU10

5.2.1.3. Summary of the glass from trench UU10

The data from trench UU10 can be summarised as follows. The UU10 sequence primarily indicates dumping activity, meaning the glass assemblage should be interpreted accordingly. A total of 16 unique vessels were estimated, equating to 6.15 vessels/m^3. Open forms dominate the diagnostic assemblage over closed and semi-open vessels by a ratio of 3:1. Most of the glass is of naturally coloured LGB and IB colour groups, with few deliberately coloured examples. Only three fragments (1.03% of the assemblage) exhibit any decoration, though one of these (the scratch-engraved fragment - U-GL90) can be dated to the 9th century AD with some certainty, thus suggesting a relatively late date for the filling of Pit B. That said, there is some evidence that Pit B has been disturbed, with fragments from contexts (003), (004) and (008) originating from the same vessel. An alternative explanation for this mixing could be that Pit B was filled in one go from a common source - not unlikely should it have been cut for the purposes of dumping. Indeed, the excavators mistakenly included some material from Pit A (004a) with context (003), meaning that disturbance is not entirely necessary to explain the context (003) match.

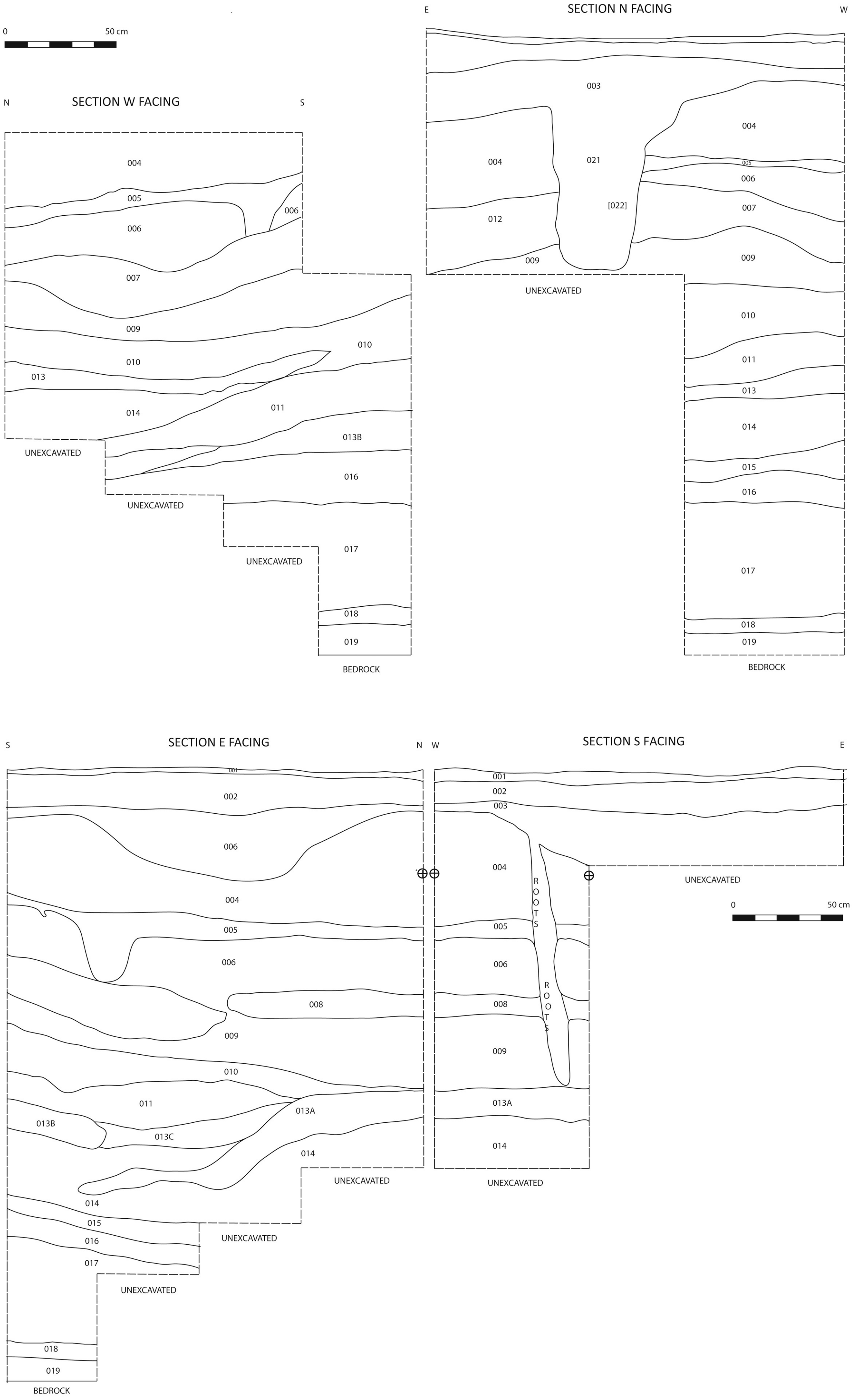


FIG. 5.9: SECTIONS FROM TRENCH UU11 (SEALINKS PROJECT 2011)

5.2.2. UU11

5.2.2.1. The archaeology

Trench UU11 (see §B.1.2), 2 x 2 m in extent, was located 25 m from the modern beach and 10 m from a brick wall built around the site of the Menai Bay beach bungalows resort (Figs. 5.9). The total volume of deposits excavated is estimated at 9.34 m^3. The excavations reveal a complex recurring pattern of 'progradation and regression' of the beach. The occupation evidence is concurrent with intermittent midden activity as well as trading activity, and no structural remains were found. In terms of dating, the excavators preliminary interpretation has suggested that phases 1-7 can be loosely placed in the mid-7th to 8th century AD, phases 8-13 in the 9th century AD and later, and phase 14 in the modern era.

UU11	Contexts	No. Fragments	Weight (g.)	Surface Area (mm^2)
Phase 14	001	7	2.82	900
	002	31	27.98	4395
Phase 13	003	54	41.08	7935
Phase 12	004	76	26.36	7020
Phase 11	005	1	0.5	125
Phase 10	006	10	11.67	2850
Phase 9	007	27	2.71	1480
Phase 8	008	-	-	-
Phase 7	009	3	5.71	1350
Phase 6	010	20	3.34	1080
Phase 5	011	7	0.77	375
Phase 4	012	3	0.15	80
	013	27	5.06	2410
Phase 3	014	83	42.56	11795
Phase 2	015	10	5.34	1500
	016	31	9.95	3110
	017	166	88.85	22110
Phase 1	018	8	1.95	600
	019	6	1.74	650
	TOTAL	570	278.54	69765

FIG. 5.10: QUANTITY OF GLASS FROM TRENCH UU11

5.2.2.2. The glass

A total of 570 fragments of glass were found in UU11 (278.54 g., 69,765 mm^2). The glass is distributed throughout the phased sequence, from the bottom to the top (Fig. 5.10). In absolute terms, the greatest quantity of the glass, 166 fragments (88.95 g., 22,110 mm^2), is found in context (017), phase 2 - described as an ephemeral occupation - though this appears to be the largest context in terms of size (based on the section drawings).

The majority of the fragments from UU11, 85.44%, are undiagnostic body sherds (487 fr., 180.54 g., 48,360 mm^2). Rim and neck fragments make up 7.19% of the UU11 assemblage, with a total of 41 fragments (16.23 g., 5080 mm^2), with 37 base fragments and five miscellaneous fragments. The vast majority of the rims, a total of 38 fragments (13.98 g., 4,455 mm^2), belong to open vessel forms, with only two fragments indicating closed forms (1.37 g., 500 mm^2), and one indicating a semi-open form (0.88 g., 125 mm^2). Altogether, these 41 fragments seem to represent 38 unique vessels.

OPEN	No. Fragments	No. Vessels	Findspot
Plain rims (rounded)	25	22	002 (2); 004 (1); 005 (1); 006 (2); 007 (2); 010 (2); 014 (1); 016 (5); 017 (8); 019 (1)
Plain rims (fine)	6	6	003 (1); 004 (1); 007 (1); 014 (1); 017 (2)
Stepped rims	6	6	014 (1); 017 (5)
Triangular-beaked rims	1	1	015 (1)
TOTAL	38	35	-

FIG. 5.11: OPEN RIM TYPES FROM TRENCH UU11

The 38 fragments belonging to open vessel forms dominate the diagnostic assemblage from UU11 (Fig. 5.11). These fragments are distributed throughout almost the entire sequence, following the general pattern described above. Altogether, these 38 fragments seem to represent a minimum of 35 original vessels, with several vessels represented by more than one fragment. Four types of open vessel are represented. Most common are those with *plain rims (rounded)*, of which there are 25 fragments, equating to 22 vessels, with U-GL474 represented by two fragments, and U-GL503/509 and U-GL664/665 from the same vessels respectively. While present throughout the sequence, *plain rims (rounded)* are most common in the lower contexts, particularly Phase 2 context (016) and (017). Six fragments have been identified as *plain rims* *(fine)*, corresponding to a range of open vessels some 70 to 90 mm in diameter, each representing a unique vessel to give an estimate of six vessels. Again these fragments are found throughout the sequence, specifically in Phase 2 context (017), Phase 3 context (014), Phase 9 context (007), Phase 12 context (004) and Phase 13 context (003). Another six fragments boast *stepped rims*, with each representing a unique vessel to give a total of six. Unlike with the above types, instances of open vessels with *stepped rims* are confined to the early part of the sequence in UU11, specifically Phase 2 context (017) and Phase 3 context (014). Finally, a single fragment (U-GL648) represents a vessel with a *triangular-beaked rim*. This type, closely related to the *stepped rim* is also found in the early part of the sequence in Phase 2 context (015).

CLOSED & SEMI-OPEN	No. Fragments	No. Vessels	Findspot
Folded and flattened rims	1	1	019 (1)
Neck C	1	1	014 (1)
Vertical neck (wide)	1	1	004 (1)
TOTAL	3	3	-

FIG. 5.12: CLOSED RIM TYPES FROM TRENCH UU11

Of the two closed fragments (Fig. 5.12), one consists of a *folded and flattened rim* (U-GL864), the other of type *neck C* (U-GL572), with each indicating a unique vessel. Both are located in the lower part of the UU11 sequence, in contexts (019) and (014) respectively, that is, in Phase 1 and Phase 3. The single semi-open vessel form is represented by a fragment with a *vertical neck - wide* (U-GL382). This fragment was recovered from near the top of the UU11 sequence in context (004), Phase 12; late in the sequence and, if the excavators dating is correct, late in terms of chronology.

Regarding the 37 base fragments (Fig. 5.13), of these 26 belong to 'push-up' bases, with a single fragment of *push-up 2*, five fragments of *push-up 3*, seven of *push-up 4* and one of *push-up 5*, with the remaining 12 fragments recorded in the category *edge of push-up*. The 'push-up' bases were again distributed throughout the sequence, from Phase 2 context (017) to Phase 14 context (002). This distribution appears to follow the general distribution of glass within UU11, with no particular patterns discernible between the specific size types. The second most common of the base categories is the *flat to rounded* type, represented on eight occasions through the sequence, again from Phase 2 context (017) to Phase 14 context (002). Of the other bases, UU11 boasts three types for which single examples have been found at Unguja Ukuu. Among these rarities is an *angular base* (U-GL327), found in the later part of the sequence (Phase 13) in the sand pit represented by context (003). Another rare find is an *applied pad base* (U-GL757) - though this time found early in the sequence in Phase 2 context (017). The third and final rare base type found in UU11 is an *applied ring base* (U-GL500), found in Phase 6 context (010), in the mid-part of the sequence.

BASES	**No. Fragments**	**Findspot**
Push-up 2	1	006 (1)
Push-up 3	5	003 (1); 004 (1); 016 (1); 017 (2)
Push-up 4	7	006 (1); 014 (3); 017 (3)
Push-up 5	1	016 (1)
Edge of push-up	12	002 (3); 003 (1); 004 (1); 014 (3); 015 (2); 017 (2)
Flat to rounded	8	002 (1); 003 (1); 009 (2); 013 (1); 014 (2); 017 (1)
Angular base	1	003 (1)
Applied pad base	1	017 (1)
Applied ring base	1	010 (1)
TOTAL	37	-

FIG. 5.13: BASE FRAGMENTS FROM TRENCH UU11

Of the five miscellaneous fragments (Fig. 5.14), three consist of internal body folds, all found relatively early in the sequence in Phase 2 contexts (017) and (016), and Phase 4 context (013). The remaining two represent pieces of trailed glass which have broken away from their original host vessel, both located in Phase 2 context (017). One of these, U-GL718, is probably a piece of decorative trail, however the other, U-GL802, may represent a trailed handle.

MISC.	**No. Fragments**	**Findspot**
Internal body folds	3	013 (1); 016 (1); 017 (1)
Trail	2	017 (2)
TOTAL	5	-

FIG. 5.14: MISCELLANEOUS FRAGMENTS FROM TRENCH UU11

In addition to these trailed fragments, decoration is visible in regard to eight other fragments (Fig. 5.15) - all according to the *pinched* technique (§3.5.6). Again these are mostly distributed in the early part of the sequence, Phase 2 context (017), with a single exception in Phase 9 context (007). In terms of the glass metals (Fig. 5.16), again LGB glass is most common (34.74%, 198 fr., 82.87 g., 20180 mm^2), followed by IB (27.89%, 159 fr., 90.42 g., 23555 mm^2), CL (17.02%, 97 fr. 35.42 g., 11400 mm^2), OG (12.46%, 71 fr., 34.5 g., 8610 mm^2), BL (3.33%, 19 fr., 2.6 g., 1305 mm^2), COR (3.33%, 19 fr., 29.43 g., 3815 mm^2), EG (0.35%, 2 fr., 1.26 g., 275 mm^2), TQ (0.35%, 2 fr., 1.14 g., 255 mm^2) and Unknown (0.35%, 3 fr., 0.9 g., 370 mm^2) glass groups.

DECORATION	No. Fragments	Findspot
Trailed	2	017 (2)
Pinched	8	007 (1); 017 (7)
TOTAL		

FIG. 5.15: DECORATED FRAGMENTS FROM TRENCH UU11

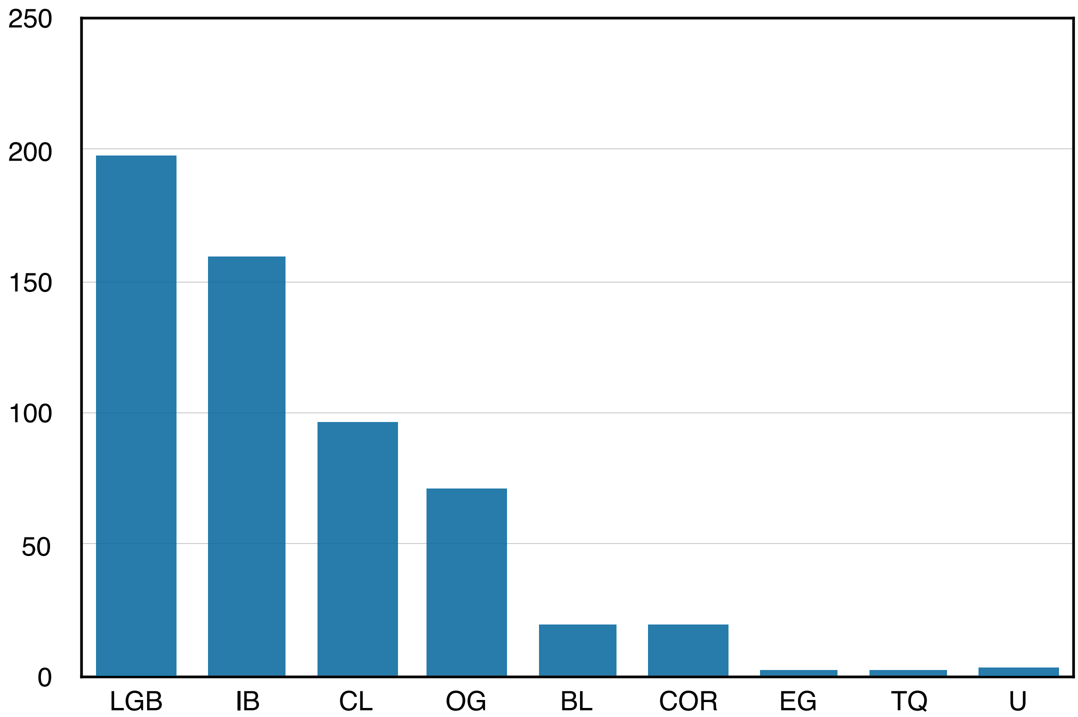


FIG. 5.16: COLOUR GROUPS FROM TRENCH UU11

5.2.2.3. Summary of the glass from trench UU11

Again trench UU11 seems to have explored an area used for dumping located along the foreshore, the process of which was regularly interrupted by beach transgression presumably following high tides or storms. A total of 38 vessels have been estimated based on the rim fragments, giving a density of 4.07 vessels/m^3. Open forms dominate the assemblage even more dramatically than in trench UU10, with 38 open vessels compared to three of closed and semi-open types. Altogether 10 fragments possess some form of decoration, though all of these may represent just two or three original vessels. As in the UU10 assemblage, LGB and IB colour groups dominate. The UU11 sequence does not seem to have been much disturbed, as indicated by the small number of cross-contextual matches between fragments and the preserved integrity of the beach lenses throughout. No precisely datable fragments were recovered, though in general the diagnostic types agree with the sequence dating.

5.2.3. UU12

5.2.3.1. The archaeology

Trench UU12, 3 x 1 m, was to be located at the south of the site in the same area as UU10, however it was abandoned after 0.2 m due to lack of time (see §B.1.3). Just 0.6 m^3 of deposits were excavated. As such, there are no results from UU12 worthy of discussion.

5.2.3.2. The glass

Owing to the fact that the excavation of trench UU12 was curtailed soon after it commenced, little glass was recovered from the relevant contexts (Fig. 5.17). Altogether, the brief excavations produced 25 fragments of glass (9.28 g., 2865 mm^2). All of the glass from UU12 was found in context (002), interpreted as being formed and affected by recent occupation in the vicinity.

UU12	No. Fragments	Weight (g.)	Surface area (mm^2)
002	25	9.28	2865
TOTAL	25	9.28	2865

FIG. 5.17: QUANTITY OF GLASS FROM TRENCH UU12

Altogether, 92% of these fragments (23 fr., 6.72 g., 2315 mm^2) have been identified as undiagnostic body fragments, with the remainder including a single rim and base fragment (Fig. 5.18). The rim fragment, U-GL889, consists of an open vessel form with a *plain rim (rounded)* - the most common type seen at Unguja Ukuu - thus evidencing one single vessel. The base fragment, U-GL872, has been identified as a *flat to rounded base*.

DIAGNOSTICS	No. Fragments	No. Vessels	Findspot
Plain rim (rounded)	1	1	002 (1)
Flat to rounded base	1	-	002 (1)

FIG. 5.18. DIAGNOSTIC TYPES FROM TRENCH UU12

None of the fragments, whether body, rim or base, exhibit any form of embellishment or decoration. In terms of the range of glass colours present (Fig. 5.19), LGB glass is most common (68%, 17 fr., 5.62 g., 1950 mm^2), followed by IB (16%, 4 fr., 3.28 g., 700 mm^2), CL (8%, 2 fr., .25 g., 125 mm^2), BL (4%, 1 fr., 0.06 g., 40 mm^2) and OG (4%, 1 fr., 0.07 g., 50 mm^2) glass.

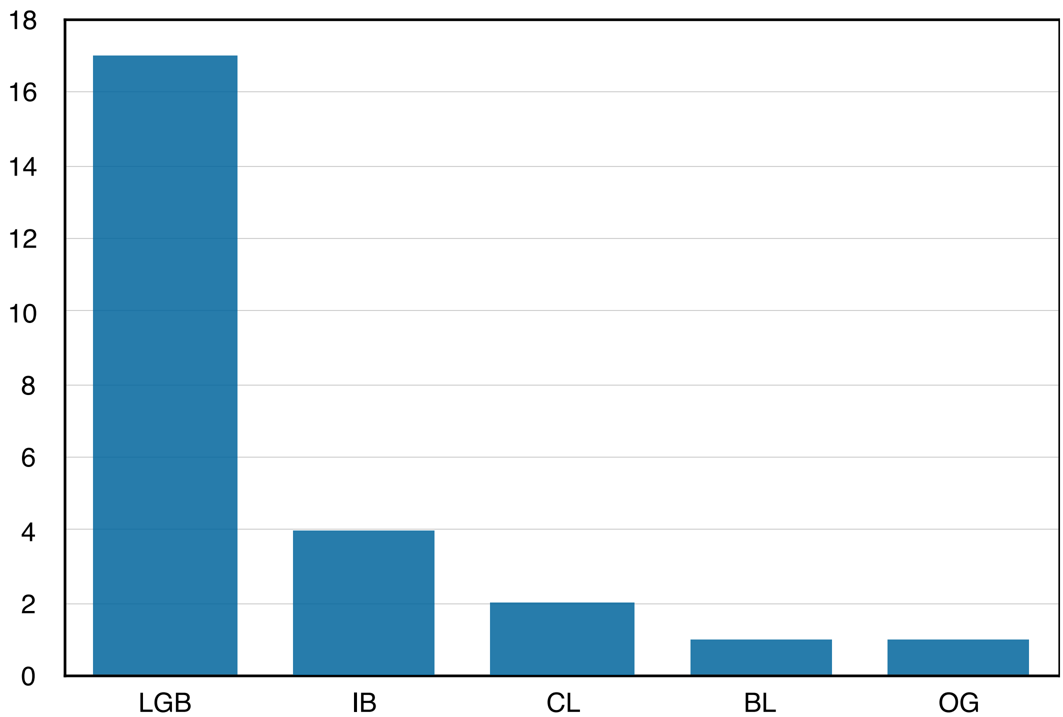


FIG. 5.19. COLOUR GROUPS FROM TRENCH UU12

5.2.3.3. Trench UU12 Summary

There is little to summarise for this excavation, owing to its short-lived nature and correspondingly low quantity of glass.

5.2.4. UU13

5.2.4.1. The archaeology

Trench UU13, 2 x 1 m, was located behind the Menai Bay beach resort on the north-east side (see §B.1.4). The total volume of deposits excavated from trench UU13 has been estimated at 2.4 m^3. Phase 1 consists of midden deposits lying above blocks of coral rag which probably represent the natural bedrock (Fig. 5.20). The dumping activities appear to date to the 7th-9th centuries AD. Phase 2 of the sequence consists of a pit and associated lime burning layer dated to the 10th-11th century AD on the basis of the discovery of some sgraffiato pottery, followed by the recent disturbed top-soil in Phase 3.

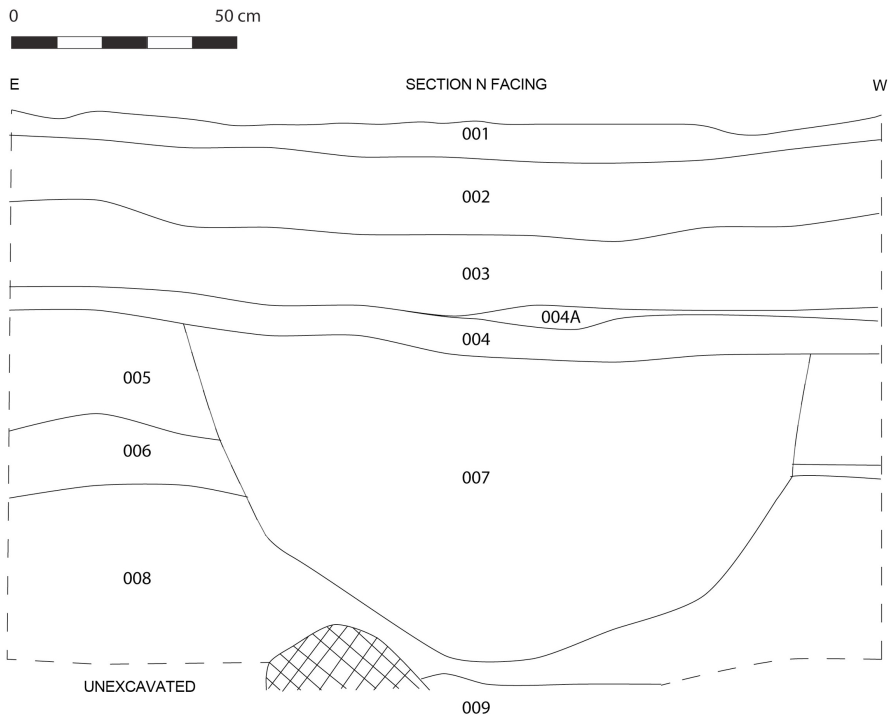


FIG. 5.20. SECTION OF TRENCH UU13 (SEALINKS PROJECT 2011)

5.2.4.2. The glass

Only 42 fragments of glass (12.93 g., 4,265 mm^2) were excavated from trench UU13 (Fig. 5.21). The vast majority of this appears to be concentrated in two main contexts, that is, contexts (006) and (008). Both these contexts, along with context (005), make up the provisional trench phase 1 - interpreted as a mix of occupation debris and shell midden material - and which boasts 37 of the fragments (11.75 g., 3765 mm^2). Very little glass is found in the remaining, later phases.

As to be expected most of the glass from UU13, at 88.10%, are body fragments (37 fr., 10.25 g., 3,640 mm^2), along with four rim fragments (2.29 g., 500 mm^2) and a single base (0.39 g., 125 mm^2). As usual, the body fragments carry little typological information or other diagnostic characteristics.

	Contexts	No. Fragments	Weight (g.)	Surface Area (mm^2)
Phase 3	**001**	-	-	-
	002	1	0.29	50
Phase 2	**003**	2	0.35	225
	004	-	-	-
	007	2	0.54	225
Phase 1	**005**	2	0.26	150
	006	25	9.37	2615
	008	10	2.12	1000
Natural	**009**	-	-	-
TOTAL		42	12.93	4265

FIG. 5.21. QUANTITY OF GLASS FROM TRENCH UU13

The rims include three open fragments and a single closed fragment (Fig. 5.22). All are found in context (006), phase 1, the most numerous glass-producing context. The open forms include two fragments in the type *plain rim (thick)* which appear to represent the same vessel, and a single fragment with an *inwards-folded rim* giving estimate of two unique vessels. The single closed vessel rim type consists of *neck type B* from context (006) (Fig. 5.23).

OPEN	No. Fragments	No. Vessels	Findspot
Plain rim (thick)	2	1	006 (2)
Inwards-folded rim	1	1	006 (1)
TOTAL	3	2	-

FIG. 5.22. OPEN RIM TYPES FROM TRENCH UU13

CLOSED	No. Fragments	No. Vessels	Findspot
Neck B	1	1	006
TOTAL	1	1	-

FIG. 5.23. CLOSED RIM TYPES FROM TRENCH UU13

The base fragment from UU13 (0.39 g., 125 mm^2) belongs to a basic 'push-up' base of *type 4*, and was again found in phase 1, context (008). No miscellaneous fragments were noted.

BASES	No. Fragments	Findspot
Push-up 4	1	008 (1)
TOTAL	1	-

FIG. 5.24. BASE TYPES FROM TRENCH UU13

None of the glass from UU13 exhibits any form of decoration, though this is not surprising in itself owing to the small quantity of glass from the trench and the apparent rarity of decoration across the site as a whole. In terms of glass colour, LGB glass is most common with 59.52%, followed by CL (14.29%), IB (11.90%), OG (4.76%) and EG, BL, BK and COR glass (2.38% each).

5.2.4.3. Summary of glass from Trench UU13

The UU13 sequence is hard to interpret. The earlier phases appear to represent a pattern of debris from ephemeral activity rather than deliberate dumping per se, however a later pit and burning activity has done much to eradicate most of the sequence. This pit and burning is associated with shell production, and has been provisionally dated to the 10th-11th century by the excavators, though may indeed be later. Just three unique vessels were identified, equating to 1.25 vessels/m^3. Open forms only dominate by 2:1 over closed forms, however the minuscule numbers involved mean this statistic is misleading. For the same reasons, it is not worth reading anything in to the absence of decorated fragments or relative proportions of colour types.

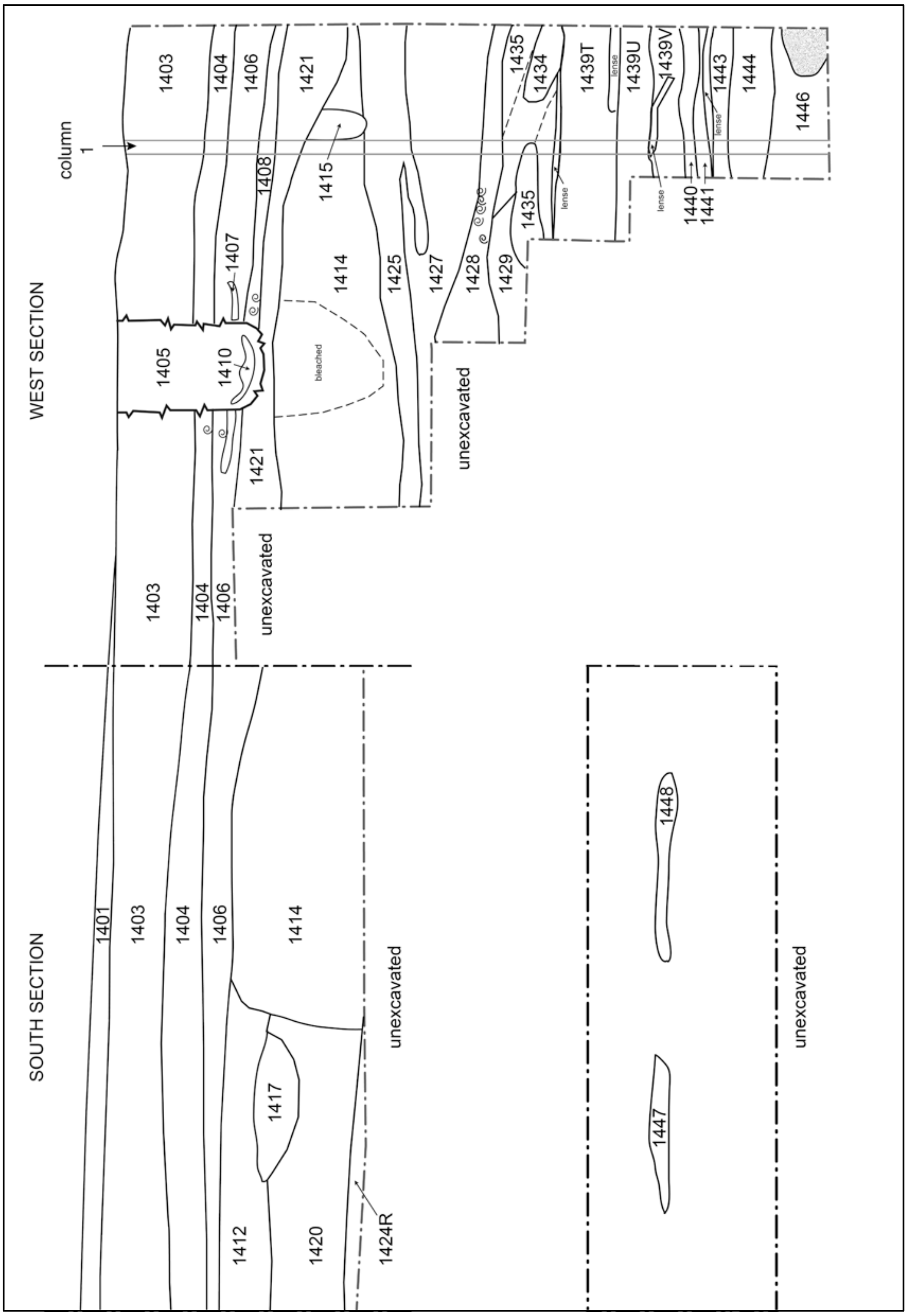


FIG. 5.25. SOUTH AND WEST SECTIONS, TRENCH UU14 (SEALINKS PROJECT 2012)

5.2.5. UU14

5.2.5.1. The archaeology

Trench UU14, 3 x 3 m, was located 3 m to the northeast of UU11, and in the area where Juma claimed to have found late 5th century AD material, approximately 7-8 m from the back-beach (see §B.1.5). The total volume of deposits excavated amount to 18.39 m^3. The sequence revealed a 15th century burial (period III), which had been cut through trampled occupation surfaces (period II) dated to the late-8th to 9th century AD, and into material rich midden deposits considered mid-7th to 8th century AD in date (period I) (Figs. 5.25, 5.26).

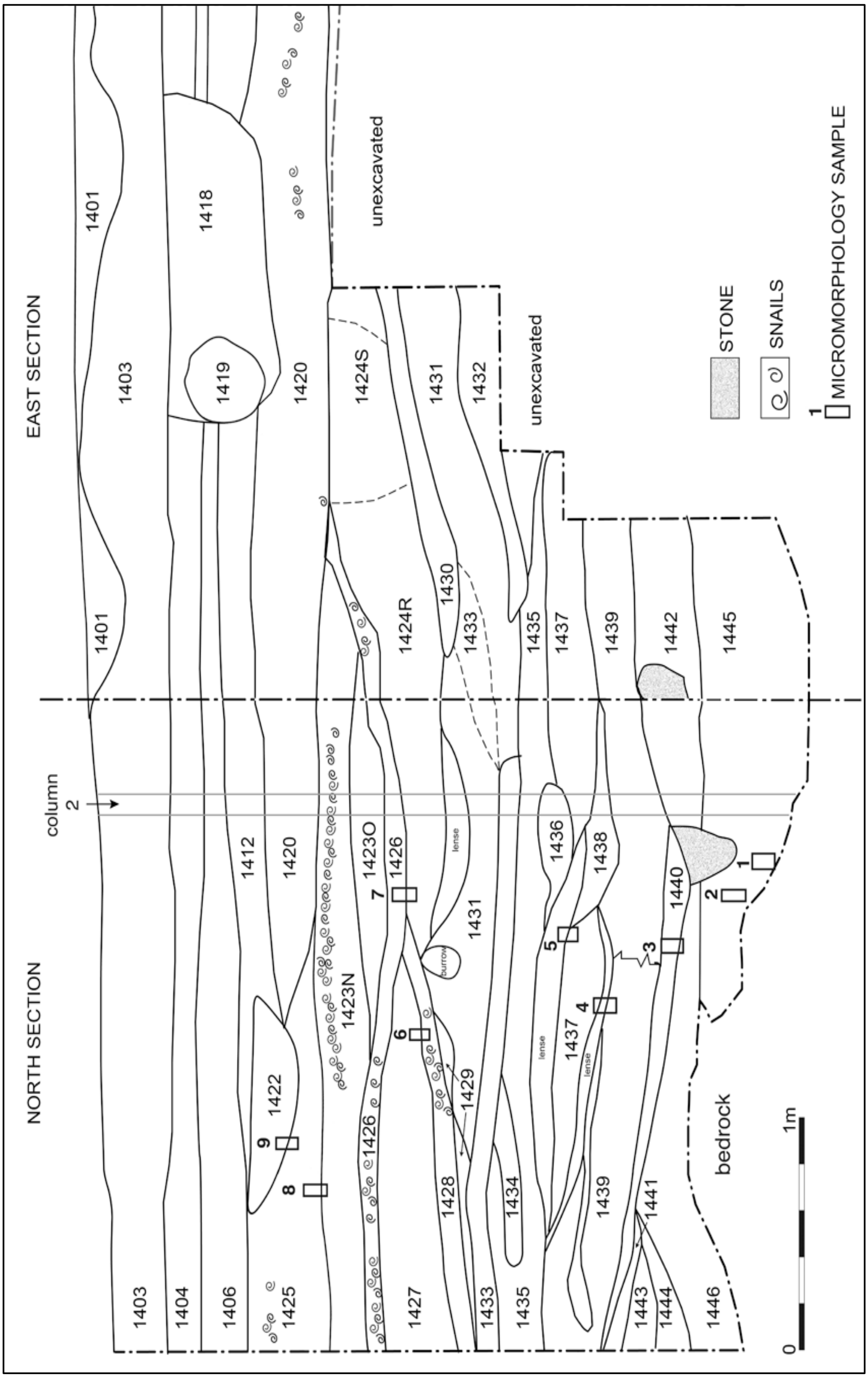


FIG. 5.26. NORTH AND EAST SECTIONS, TRENCH UU14 (SEALINKS PROJECT 2012)

Period	Phase	Contexts	No. Fragments	Weight (g.)	Surface Area (mm^2)
Period III	Phase 10	1400	-	-	-
		1401	-	-	-
		1402	-	-	-
Period II	Phase 9	1405	25	2.52	1290
	Phase 8	1403	171	104.95	19345
		1404	657	255.86	45770
	Phase 7	1406	230	109.06	21850
		1408	12	5.45	1430
		1412	140	72.83	14465
	Phase 6	1414	14	5.68	2125
	Phase 5	1417	17	11.17	2185
		1418	68	58.67	7845
		1420	29	9.19	3675
		1421	10	5.15	1250
		1423	150	71.44	15395
		1425	10	5.24	1600
		1426	3	1.02	210
Period I	Phase 4	1424	19	8	2300
		1427	5	1.42	600
		1428	29	8.2	2835
		1431	49	44.61	10625
		1432	2	0.59	150
		1433	5	23.96	2175
		1434	7	4.56	1225
		1435	11	3.91	1475
		1436	48	36.89	7250
		1437	3	1.94	475
	Phase 3	1438	41	10.7	3955
		1439	82	65.78	12185
		1440	110	69.28	13075
		1442	8	2.2	775
		1443	30	17.55	4160

Period	Phase	Contexts	No. Fragments	Weight (g.)	Surface Area (mm^2)
	Phase 2	**1445**	17	19.43	3550
		1446	30	20.25	5150
Natural	**Phase 1**	**1449**	-	-	-
		TOTAL	**2032**	**1057.5**	**210395**

FIG. 5.27. QUANTITY OF GLASS FROM TRENCH UU14

5.2.5.2. The glass

The majority of the glass from Unguja Ukuu was excavated from trench UU14, with a total of 2032 fragments found (1057.5 g., 210395 mm^2). The glass is distributed throughout UU14 (Fig. 5. 27), being present from the earliest occupation layers (phase 2) and continuing throughout the sequence with the exception of the final, upper levels (phase 10 - modern dumping at surface level). In absolute terms, glass is present in the highest quantities in the early part of the sequence (phases 2, 3 and 4), peaking in phase 5. Smaller peaks in subsequent phases (7 and 8) contrast with near absences in the late phases (6, 9 and 10). When the volume of certain contexts is taken into consideration, the biggest quantities are confirmed as being in phases 2 to 5.

Again the majority of the glass from UU14 consists of body fragments, with a total of 81.74% (1661 fr., 580.33 g., 133,550 mm^2), followed by 7.14% base fragments (145 fr., 319.61 g., 46,720 mm^2), 10.68% rim fragments (217 fr., 155.6 g., 29,715 mm^2), and 0.44% miscellaneous pieces (9 fr., 1.96 g., 410 mm^2). The 217 rim fragments provide a much larger assemblage to analyse than the other trenches discussed thus far. The vast majority of these, 193 fragments, represent open vessel forms (81.38 g., 22,265 mm^2), with 16 closed (66.77 g., 5275 mm^2) and 8 semi-open fragments (7.45 g., 2,175 mm^2) respectively.

The 193 open rim fragments can be divided into eight distinct rim types, seemingly representing 150 unique vessels (Fig. 5.28). Most common are *plain rims (rounded)* of which we can identify 108 fragments (34.93 g., 10,265 mm^2), equating to 87 unique vessels. Next most common are the *stepped rims*, of which there are 30 fragments (8.87g., 2775 mm^2), giving a figure of 22 vessels, while the related type of *triangular-beaked rims* are evidenced by only nine fragments (7.14 g., 1,375 mm^2), originating from seven unique vessels. *Plain rims (fine)* are found on 29 occasions (8.33 g., 4,050 mm^2) equating to 21 original vessels, though there are only two fragments belonging to *plain rims (thick)* (1.01 g., 300 mm^2), representing two unique vessels. The distinctive *inwards-folded rim* is represented on 10 occasions (13.55 g., 2,200 mm^2), though this only amounts to five unique vessels. Finally there are smaller numbers of *rolled-in rims*, with the four such fragments (1.6 g., 600 mm^2) evidencing four vessels, and a single fragment interpreted as a *plate* (5.95 g., 700 mm^2).

In terms of the distribution of the open rim forms, those which are found in reasonable numbers appear distributed throughout the sequence from the earliest to the later phases. For example, the *plain rims (rounded)* are found from the earliest part of the UU14 sequence, though its highest quantities are found in phases 7 and 8, that is those associated with the trampled surfaces, while *plain rims (fine)*, *stepped rims*, and *inwards-folded rims* are equally as common in the early phases as they are in phases 7 and 8. *Plain rims (thick)*, *rolled-in rims* and *plates* are only found in the middle phases, though these are present in such small numbers that their absence from certain phases is not in itself significant.

OPEN	No. Fragments	No. Vessels	Findspot
Plain rims (rounded)	108	87	1403 (8); 1404 (17); 1405 (1); 1406 (9); 1408 (4); 1412 (10); 1418 (3); 1420&1421 (1); 1421 (1); 1423 (6); 1424 (2); 1428 (1); 1431 (2); 1435 (1); 1436 (6); 1438 (1); 1439 (1); 1440 (5); 1442 (1); 1443 (4); 1445 (2); 1446 (1)
Stepped rims	30	22	1403 (1); 1404 (3); 1406 (2); 1412 (2); 1420 (1); 1421 (1); 1425 (1); 1431 (1); 1435 (1); 1435&1436 (1); 1438 (2); 1439 (1); 1440 (2); 1442 (2); 1446 (1)
Triangular-beaked rims	9	7	1406 (1); 1412 (1); 1423 (1); 1439 (1); 1440 (1); 1443 (2)
Plain rims (fine)	29	21	1403 (1); 1404 (1); 1404&1405 (1); 1406 (4); 1412 (1); 1414 (1); 1418 (2); 1420 (1); 1423 (2); 1428 (1); 1431 (1); 1434 (1); 1436 (1); 1438&1440 (1); 1440 (1); 1445 (1)
Plain rims (thick)	2	2	1403 (1); 1412 (1)
Inwards-folded rims	10	5	1404 (1); 1406 (2); 1436 (1); 1446 (1)
Rolled-in rims	4	4	1404 (1); 1408 (1); 1423 (1); 1428 (1)
Plate	1	1	1436 (1)
TOTAL	193	149	-

FIG. 5.28. OPEN RIM TYPES FROM TRENCH UU14

The remaining rim fragments have been organised into seven closed and three semi-open types, each of which is represented by no more than a handful of fragments (Fig. 5.29). Altogether, we can estimate 16 closed vessels and four semi-open vessels. Among the closed forms, most common are the *folded and flatted rims* with six fragments (10.36 g., 925 mm^2), each belonging to a unique vessel giving a total of six. These are accompanied by five fragments (20.82 g., 1375 mm^2) from vessels with *ribbed necks (narrow)*, again each of which represents a unique vessel giving a total of five. The remaining closed rim types are evidenced by a single fragment in each case, including the *flaring necks (straight)* (0.44 g., 200 mm^2), *flaring necks (wide-mouthed)* (0.54 g., 100 mm^2), *neck type A* (1.35 g., 250 mm^2), *neck type C* (32.64 g., 2300 mm^2) and a *miniature jar* (0.62 g., 125 mm^2) types. Regarding the semi-open types, five fragments belong to a modern vessel with a similar rim profile to that of a wine glass (4.28 g., 1550 mm2), all of which belong to the same vessel. Two fragments have been identified as belonging to a vessel with a *flaring neck (bevelled rim)* (1.67 g., 275 mm^2), though each exhibits a different colour group and thus represents a unique vessel to give a total of two. Finally, the remaining semi-open fragment has been categorised as a *vertical neck (wide)* (1.5 g., 350 mm^2).

CLOSED & SEMI-OPEN	**No. Fragments**	**No. Vessels**	**Findspot**
Folded and flattened rims	6	6	1404 (1); 1412 (1); 1423 (2); 1433 (1); 1440 (1)
Ribbed necks (narrow)	5	5	1406 (3); 1412 (1); 1418 (1)
Flaring necks (straight)	1	1	1443 (1)
Flaring necks (wide-mouthed)	1	1	1440 (1)
Neck A	1	1	1423 (1)
Neck C	1	1	1404 (1)
Miniature jar	1	1	1404 (1)
Flaring neck (bevelled rim)	2	2	1406 (1); 1433 (1)
Vertical neck (wide)	1	1	1404 (1)
Modern wine glass	5	1	1403 (1)
TOTAL	24	20	

FIG. 5.29. CLOSED AND SEMI-OPEN RIM TYPES FROM TRENCH UU14

Regarding the distribution of the closed and semi-open vessels, the smaller numbers involved reduce the potential significance of this analysis when compared to the open rim types. The *folded and flattened rims* seem to be distributed more or less evenly throughout the sequence from phases 3 to 8, while the *ribbed necks (narrow),* the other relatively numerous variety, are found mostly in phase 7, that is the first of the trampled floors. The single *miniature jar*, *neck C*, *vertical neck (wide)* and *modern* fragments are also found in association with phases 7 and 8. The presence of the *modern* vessel fragments in phase 8 must be explained by recent disturbance of this part of the sequence leading to the incorporation of some intrusive material. The single *flaring - straight* and *flaring - wide-mouthed* rim types are found in phases 2 and 3.

BASES	**No. Fragments**	**Findspot**
Push-up 1	5	1404 (1); 1406 (1); 1414 (1); 1423 (2)
Push-up 2	2	1406 (1); 1443 (1)
Push-up 3	8	1404 (1); 1406 (2); 1412 (1); 1418 (1); 1420 (1); 1436 (1); 1445 (1)
Push-up 4	7	1403 (1); 1406 (2); 1408 (1); 1428 (1); 1431 (1); 1436 (1)
Push-up 5	6	1412 (1); 1431 (2); 1434 (1); 1439 (1); 1440 (1)
Push-up 6	2	1404 (1); 1406 (1)
Push-up L	2	1403 (1); 1431 (1)
Edge of push-up	78	1403 (6); 1404 (13); 1406 (15); 1408 (1); 1412 (7); 1414 (1); 1417 (1); 1418 (2); 1420 (1); 1423 (6); 1431 (2); 1434 (1); 1435 (1); 1436 (1); 1438 (1); 1439 (7); 1440 (5); 1443 (2); 1446 (3)
Flat to rounded bases	27	1403 (1); 1404 (6); 1406 (1); 1412 (3); 1414 (1); 1418 (2); 1420 (1); 1423 (3); 1424 (1); 1425 (2); 1427 (1); 1428 (1); 1431 (1); 1436 (1); 1439 (1); 1440 (1)
Folded ring bases	6	1404 (4); 1406 (1); 1439 (1)
Plates	2	1418 (1); 1433 (1)
TOTAL	**145**	**-**

FIG. 5.30. BASE FRAGMENTS FROM TRENCH UU14

A vast majority of the 145 base fragments have been identified as ‘push-up’ bases of various sizes (Fig. 5.30), five belonging to *type 1* (4.42 g., 450 mm^2), two to *type 2* (1.64 g., 450 mm^2), eight to *type 3* (9.61 g., 2500 mm^2), seven to *type 4* (18.87 g., 3250 mm^2), six to *type 5* (22.66 g., 4575 mm^2), two to *type 6* (23.42 g., 1615 mm^2), and two to *type L* (43.91 g., 4100 mm^2), with the remaining 78 (78.54 g., 14080 mm^2) placed in the *edge of push-up* category. Of the remainder, 27 fragments have been designated as *flat to rounded bases* (53.13 g., 11450 mm^2), six as *folded ring bases* (7.09 g., 725 mm^2) and two as bases of large *plates* (56.33 g., 3525 mm^2). In terms of the distribution of the bases within the sequence, the 'push-ups' and *flat to rounded* varieties appear throughout. The two plate bases are concentrated in phases 4 and 5, that is the upper part of the apparent midden deposits, while the *folded ring bases* are most common in phases 7 and 8, that is in association with the trampled floor levels, though a single example of such a base is also found in phase 3.

MISC	No. Fragments	Findspot
Applied feet	1	1446
Internal body fold	3	1404 (1); 1406 (1); 1440 (1)
Trail	5	1403 (1); 1404 (1); 1414 (1); 1440 (2)
TOTAL	**9**	**-**

FIG. 5.31. MISCELLANEOUS FRAGMENTS FROM TRENCH UU14

The miscellaneous fragments (Fig. 5.31) from UU14 consist of three *internal body folds* (0.94 g., 200 mm^2), one each from phases 7 and 8, with the other from phase 3, along with a single tear drop-shaped *applied foot* (0.17 g., 50 mm^2) from phase 2. These occurred alongside five pieces of *trailed* glass (0.85 g., 160 mm^2), recovered from phases 3 and 8. The pieces of trailed glass were presumably applied for decorative purposes (Fig. 5.32). A further seven fragments revealed traces of decoration, making a total of 13. Trailing was the most common technique in evidence, followed by four *pinched* fragments (2.1 g., 575 mm^2) from phases 3, 7 and 8, one base fragment *dimpled* on the underside with six indentations (5.82 g., 750 mm^2) also from phase 3, and two fragments of *scratch-engraved* glass (0.75 g., 350 mm^2) from phases 3 and 5.

DECORATED	No. Fragments	Findspot
Trailed	5	1403 (1); 1404 (1); 1414 (1); 1440 (2)
Pinched	4	1404 (2); 1408 (1); 1439 (1)
Dimpled	1	1439 (1)
Scratch-engraved glass	2	1420 (1); 1438 (1)
TOTAL	**12**	**-**

FIG. 5.32. DECORATED FRAGMENTS FROM TRENCH UU14

A total of ten colour groups were identified for UU14 (Fig. 5.33). IB glass is most numerous, making up 51.38% of the total (1044 fr., 440.38 g., 102770 mm^2), followed by LGB with 22.74% (462 fr., 303.98 g., 48320 mm^2), CL with 11.81% (240 fr., 104.84 g., 25395 mm^2), OG with 9.25% (188 fr., 71.78 g., 16595 mm^2), BL with 3.05% (62 fr., 92.75 g., 10,275 mm^2), EG (8 fr., 9.71 g., 1100 mm^2) and TQ (8 fr., 7.46 g., 1080 mm^2) with 0.39% each, RD (1 fr., 0.24 g., 75 mm^2) and BR (1 fr., 4.9 g., 675 mm^2) with 0.05% each, 0.84% COR (17 fr., 21.45 g., 4100 mm^2) and 0.05% undetermined (1 fr., 0.01 g., 10 mm^2).

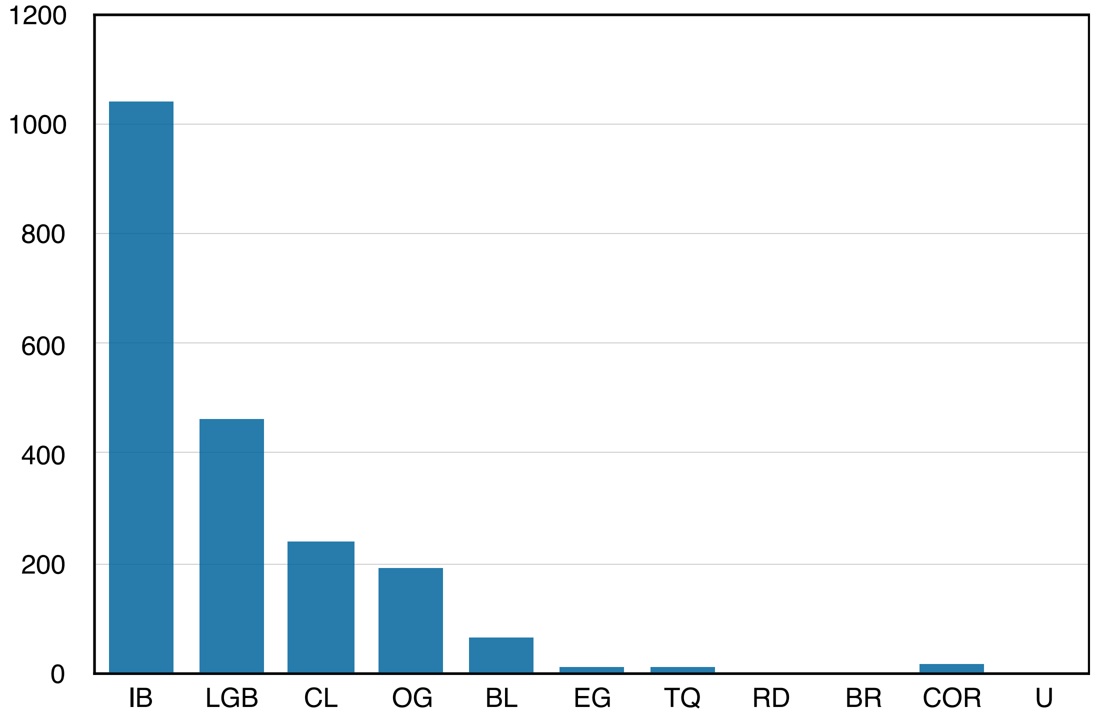


FIG. 5.33. COLOUR GROUPS FROM TRENCH UU14

5.2.5.3. Summary of Trench UU14

Trench UU14 is much more extensive and complicated than the previous trenches discussed above. The early part of the sequence reveals dumping activity and midden accumulation, but later in the sequence a number of trampled floors suggest another form of activity, though not one that can be associated with any structural features or signs of habitation. A total of 169 vessels have been identified from the rim fragments, amounting to a density of 9.19 vessels/m^3. Open vessels dominate the assemblage by 7.5:1. A larger than usual number of colour groups were identified, 10 in total, though the larger size of this assemblage probably accounts for the enhanced variety. That said, IB glass dominates the UU14 assemblage by a considerable margin, with LGB glass next most common. Just 12 fragments were found to exhibit any form of decoration, amounting to just 0.59% of the UU14 assemblage.

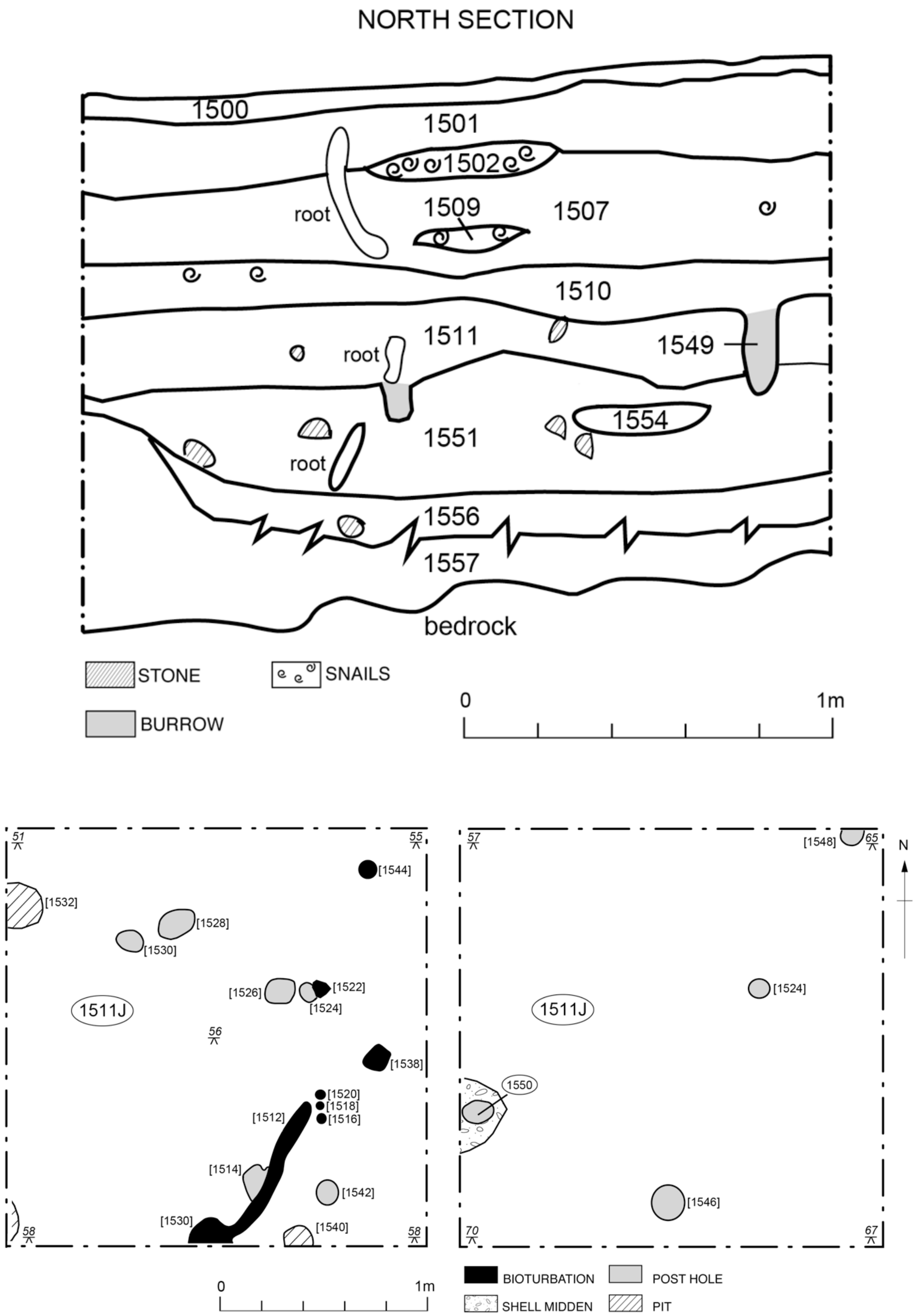


FIG. 5.34. SECTION OF TRENCH UU15 (ABOVE) AND PLAN OF PHASE 2, CONTEXT 1511, PRE- AND POST-EXCAVATION (SEALINKS PROJECT 2012)

5.2.6. UU15

5.2.6.1. The archaeology

Trench UU15, 2 x 2 m, was located 4 m west of trench UU13 (see §B.1.6). The excavated deposits totalled 4.43 m^3. Phase 1 of the sequence contains material apparently datable to the 7th-9th centuries AD, seemingly concurring with the other excavations (Fig. 5.34). A series of post-holes indicate the presence of timber structures in this part of the site in phase 2 (Fig. 5.34), again dated to the 7th-9th century based on the material assemblage. In phase 3, this area seems to have transitioned to a midden zone, as with the other trenches, with this phase of activity continuing until abandonment. The very upper activity layers suggest an 11th century date, as indicated by imported sgraffiato pottery and a local bead punctuate rim.

Phase	Context	No. Fragments	Weight (g.)	Surface Area
Phase 3	**1501**	5	7.06	900
	1502	1	0.17	100
	1507	22	9.52	2310
	1510	32	10.93	2375
Phase 2	**1511**	226	116.93	20160
Phase 1	**1551**	271	57.47	19210
	1556	47	9.67	3495
	1557	58	11.77	3170
	TOTAL	**662**	**223.52**	**51720**

FIG. 5.35. QUANTITY OF GLASS FROM TRENCH UU15

5.2.6.2. The glass

A total of 662 fragments of glass (223.52 g., 51720 mm^2) were recovered from trench UU15 (Fig. 5.35). Glass is found in all the trench phases, in which some patterns are observable. In terms of count, the majority of the glass (376 fr., 78.91 g., 25,875 mm^2) is found in phase 1, exclusively in the main occupation deposits of contexts (1557), (1556) and (1551), with the majority of that in context (1551). All of the 226 fragments of glass (116.93 g., 20,160 mm^2) from phase 2 are found in deposit (1511). Interestingly, phase 2 contains more glass than phase 1 in terms of weight, though the estimated surface area measurements support the pattern presented by fragment count. The deposits of the final phase, including the upper contexts (1501) and (1500), contains a much smaller quantity of glass with only 60 fragments in total (27.68 g., 5685 mm^2). Indeed most of these are from contexts (1510) and (1507), with only a handful from contexts (1502) and (1501).

As usual, the vast majority of the fragments from UU15, 88.82%, are body sherds (588 fr., 116.02 g., 35,445 mm^2), with 6.34% rims (42 fr., 37.66 g., 7675 mm^2), 4.08% bases (27 fr., 68.79 g., 8274 mm^2) and 0.76% miscellaneous (5 fr., 1.05 g., 325 mm^2). Of the rim fragments, the majority belong to open vessel forms with 36 fragments (21.59 g., 5625 mm^2), compared with 6 from closed vessel forms (16.07 g., 2050 mm^2).

OPEN	**No. Fragments**	**No. Vessels**	**Findspot**
Plain rims (fine)	16	7	1510 (1); 1511 (3); 1551 (2); 1557 (1)
Stepped rims	7	4	1511 (1); 1551 (3)
Triangular-beaked rims	4	3	1511 (3)
Inwards-folded rims	4	4	1511 (1); 1551 (1); 1556 (1); 1557 (1)
Splayed rims	2	1	1511 (1); 1556 (1)
Plain rims (rounded)	1	1	1511 (1)
Plain rims (thick)	1	1	1511 (1)
Flaring-sided vessels	1	1	1551 (1)
TOTAL	**36**	**22**	**-**

FIG. 5.36. OPEN RIM TYPES FROM TRENCH UU15

The 36 open vessel fragments can be divided into eight types, giving an estimate of 22 unique vessels (Fig. 5.36). Again some unusual patterns are observed, continuing the impression that the UU15 sequence represents something different. Most common are *plain rims (fine)*, which appear on 16 occasions (2.84 g., 1500 mm^2). This represents, however, an estimation of just seven unique vessels. It is interesting that this type is not found in the adjacent trench UU13. Seven fragments have been identified as *stepped rims* (8.91 g., 1775 mm^2), giving an estimated four unique vessels, with the four fragments from the related *triangular-beaked rims* (3.09 g., 450 mm^2) representing three unique vessels. All four of the fragments recorded as *inwards-folded rims* (2.53 g., 525 mm^2) seem to represent single vessels, giving an estimate of four unique vessels, with U-GL3535 presenting with an irregular shape. The two fragments recorded as *splayed rims* (1.6 g., 725 mm^2) are similar in size, profile and metal, though are found in different parts of the sequence. Here they are considered to represent a single vessel, but may well in fact represent two unique examples. An interesting observation is that *plain rims (rounded)*, the most common rim type at Unguja Ukuu, are found on just one occasion in trench UU15 (0.67 g., 200 mm^2). Single examples of *plain rims (thick)* (0.97 g., 175 mm^2) and *flaring-sided vessels* (0.98 g., 275 mm^2) were also noted, in each case thus contributing a single unique vessel.

In terms of their distribution and phasing, the majority of the *plain rims (fine)* and *stepped rims* are found in phase 1, with smaller numbers in phase 2. In terms of unique vessels, however, only three vessels with *plain rims (fine)* are found in phase 1, compared to three in phase 2, while the ratio of unique vessels with *stepped rims* is reduced to 3:1. In contrast, all of the *triangular-beaked rims* are found in phase 2. Regarding the *inwards-folded rims*, three are found in phase 1 and one in phase 2. For the *splayed rims*, one each is found in phases 1 and 2, though it has been indicated above that these originally belonged to the same vessel. The single fragment from the *flaring-sided vessel* was recorded in phase 1, while both the *plain rims (rounded)* and *plain rims (thick)* were found in phase 2. Very few open rim fragments are found in phase 3, with the sum total a single fragment of a *plain rim (fine).*

CLOSED	**No. Fragments**	**No. Vessels**	**Findspot**
Folded and flattened rims	2	2	1511 (1); 1556 (1)
Flaring necks (rolled-in rims)	2	2	1511 (1); 1557 (1)
Flaring necks (straight)	1	1	1556 (1)
Flaring necks (wide-mouthed)	1	1	1511 (1)
TOTAL	**6**	**6**	**-**

FIG. 5.37. CLOSED RIM TYPES FROM TRENCH UU15

The six closed fragments are divided among four types (Fig. 5.37). Each appears to represent a unique vessel, giving an estimated number of six unique vessels. Two fragments have been identified as *folded and flattened rims* (13.14 g., 1375 mm^2), with one each from phases 1 and 2. A further two fragments belong to vessels with *flaring necks (rolled-in rims)* (1.49 g., 450 mm^2), indeed the only such fragments identified at Unguja Ukuu, again with one from each phase. Single fragments of *flaring necks (straight)* and *flaring necks (wide-mouthed)*, the former from phase 1 and the latter from phase 2, complete the closed rim types. Although not unique to trench UU15, only one other example of each is present at Unguja Ukuu, in both cases found in trench UU14.

BASES	No. Fragments	Findspot
Push-up 1	2	1511 (1); 1551 (1)
Push-up 2	4	1507 (1); 1511 (1); 1551 (2)
Push-up 3	1	1551 (1)
Push-up 4	1	1551 (1)
Push-up 6	1	1551 (1)
Push-up L	5	1511 (5)
Edge of push-up	13	1501 (1); 1507 (2); 1510 (1); 1511 (3); 1551 (4); 1556 (1)
TOTAL	**27**	

FIG. 5.38. BASE FRAGMENTS FROM TRENCH UU15

All of the 27 base fragments recorded from UU15 can be considered as 'push-ups' (Fig. 5.38), with two of *type 1* (4.86 g., 650 mm^2), four of *type 2* (5.56 g., 975 mm^2), one of *type 3* (2.25 g., 250 mm^2), one of *type 4* (1.33 g., 325 mm^2), one of *type 6* (3.09 g., 350 mm^2), five of *type L* (39.26 g., 3250 mm^2) - though all belong to the same vessel, and 13 as *edge of push-ups* (12.44 g., 2475 mm^2).

MISC.	No. Fragments	Findspot
Trails	5	1510 (1); 1551 (3); 1556 (1)
TOTAL	**5**	**-**

FIG. 5.39. MISCELLANEOUS FRAGMENTS FROM TRENCH UU15

The miscellaneous fragments are limited to five threads of glass which would have been decoratively trailed onto completed vessels (Fig. 5.39). It is likely that some of these trails may have been applied to the same vessel, but there is no real way of telling based on the information available. Multiple metals were trailed together in some cases, and the majority have been applied in irregular patterns, though one professes a looped arrangement. All but one of the trails are from phase 1, with the other from phase 3. In addition to the trails, the only other decorated fragment present in UU15 is a piece of mosaic glass (0.25 g., 50 mm^2) from phase 2 (Fig. 5.40). This fragment is the only such example of mosaic or millefiori glass from Unguja Ukuu, and an apparently rare find in Early Islamic glassware generally

DECORATED	No. Fragments	Findspot
Mosaic/millefiori	1	1511 (1)
TOTAL	**1**	**-**

FIG. 5.40. DECORATED FRAGMENTS FROM TRENCH UU15

A total of 13 colour groups were identified in UU15 (Fig. 5.41, 5.42). In contrast to the other trenches, OG glass is the most common, making up 41.24% of the assemblage (273 fr., 41.1 g., 16630 mm^2), followed by LGB glass on 39.58% (262 fr., 84.25 g., 18600 mm^2), IB with 7.70% (51 fr., 17.9 g., 5415 mm^2), CL with 7.10% (47 fr., 61.62 g., 9125 mm^2), and smaller numbers of COR (1.66%, 11 fr., 2.97 g., 650 mm^2), EG (0.76%, 5 fr., 9.97 g., 450 mm^2), TQ (0.60%, 4 fr., 0.3 g., 100 mm^2), BL (0.45%, 3 fr., 0.63 g., 225 mm^2), BR (0.30%, 2 fr., 4.13 g., 350 mm^2), MOSAIC (0.15%, 1 fr., 0.25 g., 50 mm^2), PK (0.15%, 1 fr., 0.19 g., 50 mm^2), RD (0.15%, 1 fr., 0.15 g., 50 mm^2) and U (0.15%, 1 fr., 0.06 g., 25 mm^2) groups.

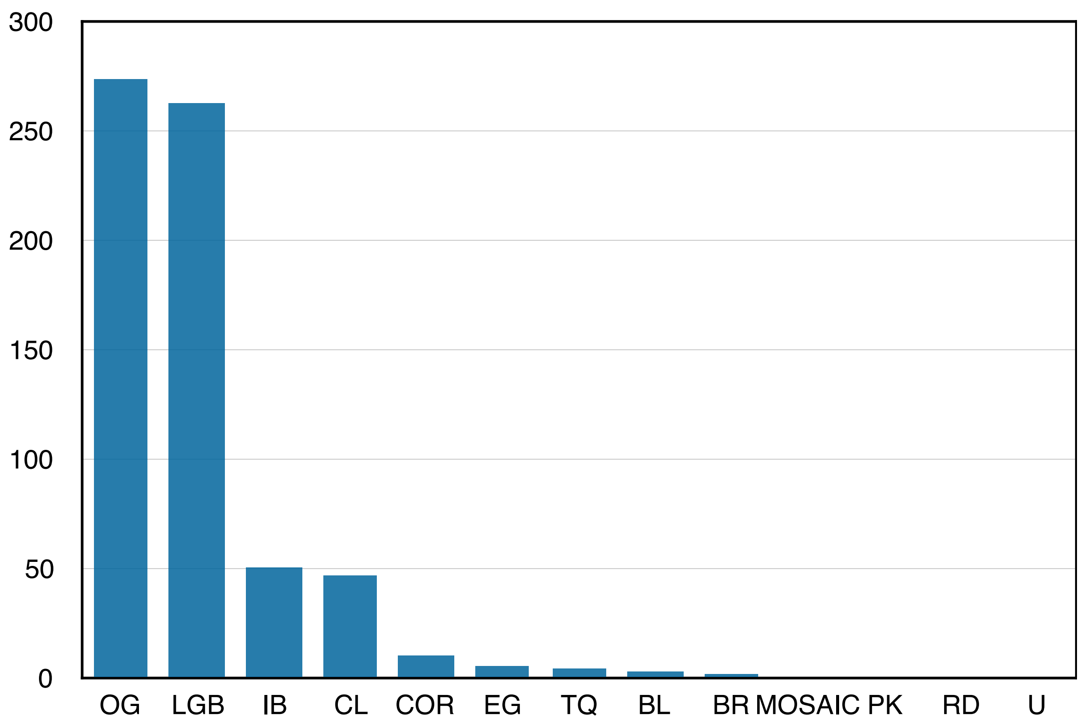


FIG. 5.41. COLOUR GROUPS FROM TRENCH UU15 (COUNT)

That said, weight presents a very different picture in which LGB glass is by far the most common (37.69%), followed by CL glass (27.57%), with OG pushed into third on 18.39%. The order of the remaining groups is of IB (8.01%), EG (4.46%), BR (1.85%), COR (1.33%), BL (0.28%), TQ (0.13%), MOSAIC (0.11%), PK (0.09%), RD (0.07%) and U (0.03%).

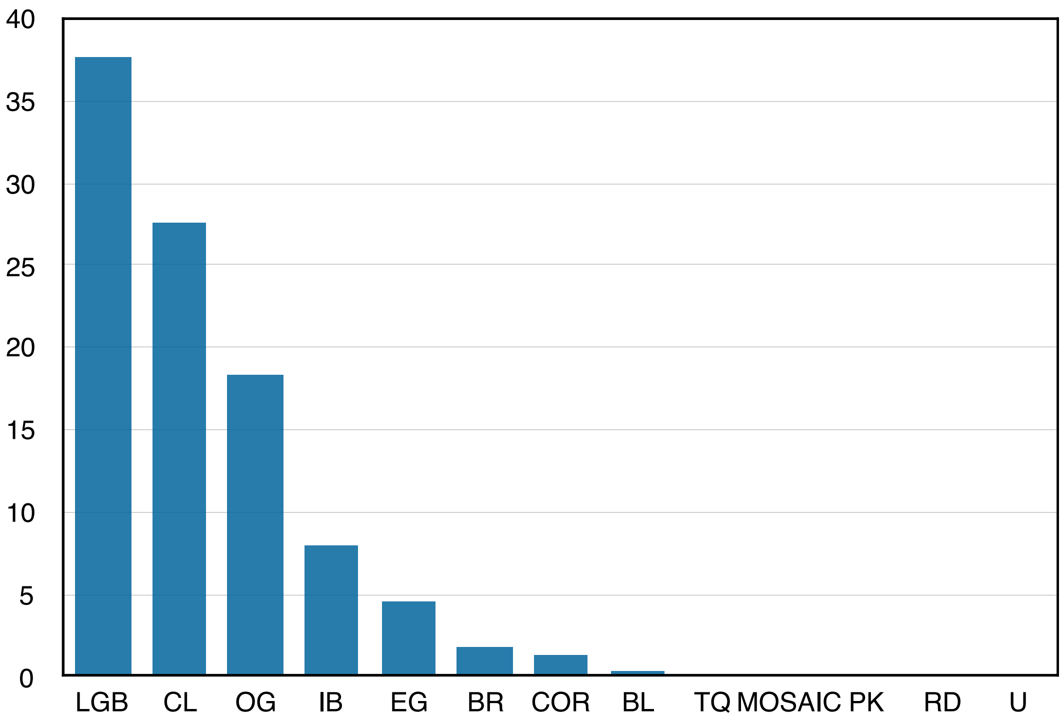


FIG. 5.42. COLOUR GROUPS FROM TRENCH UU15 (% BY WEIGHT)

5.2.6.3. Trench UU15 summary

Trench UU15 presents a sequence that is much different to the other trenches excavated, both in terms of its stratigraphy and its glass assemblage. The sequence commences with debris from an ephemeral occupation, rather than dumping per se, and later sees the only structural feature identified in the excavations. This is followed by evidence of latter 'squatter' occupation which probably took place after the initial abandonment of the site. A total of 28 vessels were identified, equating to 6.32/m^3. This figure is misleading, however, in that the vast majority of vessels were found in two main deposits, (1511) and (1551). Again open vessels dominate over closed vessels by a high margin, in this case 22 : 6. However, the specific types of open forms are present in markedly different proportions to that seen in the other trenches, with very few *plain rims (rounded)* in particular. Decoration is not common, though a piece of mosaic glass from a slumped bowl represents the rarest find in the entire assemblage.

A total of 13 colour groups were identified, the most seen in one trench at Unguja Ukuu. Again the proportion of specific groups differs from the expected, with OG, LGB and CL glass all common, but very little IB glass - in other trenches by far the most common type. Presumably the relative particularities of the sequence and glass assemblage are linked. In terms of dating, Islamic mosaic or millefiori glass can be dated to the 9th century, thus offering an idea of a date for the formation of the deposit associated with the structural feature.

5.2.7. Interpreting the glass from Unguja Ukuu

Interpretation of the data from each trench follows in the subsections below. This interpretation is divided into a number of topics, though in many cases there are overlaps between the issues. This section begin with a discussion of quantity and distribution of glass at Unguja Ukuu, followed by the role and functions it played, before tackling some of the wider issues which are revisited in chapter six.

	Fragments/m^3	**Weight/m^3**	**Surface Area/m^3**
UU10	112.31	87.8	19196
UU11	61.03	29.82	7469
UU12	-	-	-
UU13	17.5	5.39	1777
UU14	110.49	57.5	11441
UU15	149.44	50.4	11675
TOTAL	**97.55**	**48.81**	**10480**

FIG. 5.43. QUANTITY OF GLASS PER M^3 FOR EACH TRENCH

5.2.7.1. Quantity and distribution

Altogether, a total of 3625 glass fragments were recorded from Unguja Ukuu, equating to 1813.61 grams or 389,420 mm^2 of glass. As seen above, the vast majority by any measure originated within trench UU14. However, this fails to take the size of the various trenches into account. After adjusting the figures according to the volume of earth excavated for each trench, a different impression of the distribution of glass at Unguja Ukuu emerges. In terms of fragments per cubic metre (Fig. 5.43), glass is most common in trench UU15 with 149.44 fr./m^3. Trenches UU10 and UU14 are more-or-less joint in second place with 112.31 fr./m3^3 and 110.49 fr./m^3 respectively. Much lesser quantities are found in trenches UU11, with 61.03 fr./m^3, and UU13, with just

17.5 fr./m^3. Trench UU12 has been excluded from this part of the discussion owing to the fact that the excavations were curtailed almost as soon as they had begun.

Such results suggest that glass is most common in areas associated with structural occupation at Unguja Ukuu (i.e., trench UU15), but is also a relatively common find in areas used for dumping and other non-structural activities conducted towards the foreshore (i.e., trenches UU10 and UU14). The much lower quantity recorded for trench UU11 - strange in light of its proximity to UU14 - can be explained by the regular episodes of beach transgression (seen in the relatively sterile layers of beach sand) which interrupted the process of midden accumulation. The even smaller quantity of glass from trench UU13 is again strange when one considers its proximity to trench UU15. In this case the later disturbance caused by the cutting of the pit and subsequent burning undoubtedly had a major influence. What is patently clear, however, is that the quantity of glass varies markedly within the site - even between proximal locations - with a combination of natural, archaeological and taphonomic processes all responsible.

	Average Fr. Weight (g.)	**Average Fr. Surface Area (mm^2)**
UU10	0.78	170.92
UU11	0.49	122.39
UU12	0.37	114.6
UU13	0.31	101.55
UU14	0.52	103.54
UU15	0.34	78.13
TOTAL	**0.50**	**107.43**

FIG. 5.44. AVERAGE FRAGMENT WEIGHT AND SURFACE AREA

Another twist here follows the discovery that the weight and surface area measurements give different results to fragment count, though at least they broadly agree with one another (Fig. 5.44). According to these methods of quantification, glass is most common in trench UU10, followed by trenches UU14 and UU15 which present with similar densities of material. Trenches UU11 and UU13 remain much less productive. This pattern might be explained in different ways. One issue is that of fragmentation, to which fragile and brittle materials such as glass are particularly prone. As we can see in table 5.44, average fragment weights and surface areas are lower in trenches UU15 and UU14 than in trench UU10. In other words, the glass assemblages of trenches UU15 and UU14 are *more fragmentary*.

Fragmentation rates respond to use practices, site formation processes and taphonomic factors. Regarding object use and site formation, the pattern described above seems to fit the previous interpretation of the UU10 locality as a dumping ground, UU14 as a mix of dumping and other activity, and UU15 as an area of structural occupation. According to common sense practices, breakages of objects such as glass vessels in frequently-used occupation and activity zones would see larger fragments cleared away and dumped elsewhere (perhaps somewhere such as the area of foreshore explored in trenches UU10, UU11 and UU14), or trampled smaller and left in situ, perhaps having been ground into the surface. Regarding taphonomy, post-depositional disturbance of material should see fragmentation levels increase. Indeed, the longer chronology in the vicinity of trench UU15 and the intrusive burial seen in trench UU14 might therefore partially account for the higher fragmentation rates therein, compared to the relatively undisturbed trench UU10.

	No. Vessels	**Vessels/m^3**
UU10	16	6.15
UU11	38	4.07
UU12	1	1.67
UU13	3	1.25
UU14	169	9.19
UU15	28	6.32
TOTAL	**255**	**6.86**

FIG. 5.45. NUMBER OF VESSELS PER TRENCH

As a final measure of relative quantity between the various trenches estimates of the number of unique vessels evidenced by rim fragments can be considered (Fig. 5.45). Such estimates give a sum total of 255 vessels, with 169 from trench UU14, 38 from UU11, 28 from UU15, 16 from UU10, three from UU13 and one from UU12. As with the above quantities, these figures are only meaningful when excavated volume is taken into account. Corrected as such, UU14 remains the most productive sequence with 9.19 vessels/m^3, followed by trench UU15 with 6.32 vessels/m^3, and UU10 with 6.15 vessels/m^3. Again trenches UU11 (4.07 ves./m^3) and UU13 (1.25 ves./m^3) are left some distance behind. The significance of this pattern might reflect a methodological bias in part, with more potential for missing fragment links in bigger assemblages such as UU14, thus giving the impression of there being more unique vessels represented. Otherwise, the lower figures seen for UU11 and UU13 can be adequately explained as above regarding the other methods of quantification.

More difficult to understand is the much higher number of vessels represented in UU14. Possible scenarios might include a potential activity taking place in the area of UU14 which saw frequent breakage and (non-comprehensive) clearances, meaning more vessels ‘passed through’ this part of the site, however briefly, with each leaving a small but identifiable trace in the form of a partial fragment. Trading practices might be one such activity, with a high potential for glass objects to break in transit or during unloading. These fragments would likely have been dumped upon unloading, a practice that probably took place along the foreshore - that is, the area where trench UU14 is located. It is also possible that lower numbers of glass ‘passed through’ the occupation area at UU15, perhaps being utilised more carefully for longer periods, and indeed more comprehensively cleared upon breakage so as to avoid injury from sharp fragments.

As a final point on the relative distribution of glass within Unguja Ukuu, it is worth taking the sequence phasing and dating into account. Most of the deposits have been dated to the 7th-9th/10th century AD, known to reflect the main occupation of the site. The main exceptions are in trenches UU13 and UU15, both of which possess substantial depths of stratigraphy relating to post-10th century occupation not relating to the main trading period of the site. If only the fragments from the main occupation period are considered, that is the 7th-10th century AD, then the high quantity from trench UU15 seems to be even more pronounced, jumping perhaps as high as 301 fr./m^3 (97.92 g./m^3, 23,017.5 mm^2/m^3). Only small portions of the UU10, UU11 and UU14 sequences date to later periods reflecting in most cases, UU14 burial aside, modern agricultural and dumping activities. Indeed these parts of the sequence contain reasonable quantities of glass, unlike in trench UU15. As such, the much higher proportion of glass in the 7th-10th century layers in UU15 is probably significant.

5.2.7.2. The size of the glass trade and its importance in material life at Unguja Ukuu

So far the discussion has been limited the relative distribution of glass between the various trenches excavated by the Sealinks Project. However, the estimates of the number of vessels from these trenches (calculated based on rim fragments) can also be used to extrapolate towards a figure for the site as a whole. The Sealinks excavations (trenches UU10 - UU15) amount to an area excavated of 26 m^2, or a volume of 37.16 m^3. Our estimate of 255 unique vessels equates to figures of 9.81 vessels/m^2, or 6.86 vessels/m^3. As this figure is based on rim fragments alone, it is likely to be a considerable underestimate of the total number of unique vessels of which a trace is preserved in our excavations, not just as rims make up no more than a tiny proportion of the assemblage, but particularly as most of these unique vessels are evidenced by partial fragments giving a low completion rate. As such, these figures can be taken as reasonably conservative estimates. The question here is whether these figures can be used to understand the number of vessels at Unguja Ukuu as a whole.

	Estimated vessels	**Per year (short chronology)**	**Per year (long chronology)**
26 m^2	255	1.275	0.6375
1 ha	98,100	490	245
2 ha	196,200	981	490.5
5 ha	490,500	2453	1,226
10 ha	981,000	4905	2453
17 ha	1,667,700	8339	4169

FIG. 5.46. ESTIMATED NUMBER OF VESSELS FOR THE SITE

The best estimates of the size of the site are of c.17 ha, or 170,000 m^3. Calculating the potential volume of deposits in the excavated areas is even more difficult, especially as depth of deposits has been shown to vary widely within the Sealinks excavations - which reached an average depth of 2.16 m. Using this figure, a potential site volume of 367,200 m^3 might be suggested. However, on balance, this seems one leap too far, and so it will be better to confine these more exploratory analyses to the site area. Taking the figure of 17 ha and extrapolating using the figure of 9.81 ves./m^2 calculated above, leads to the hugely unlikely estimate of 1,667,700 vessels at Unguja Ukuu (Fig. 5.46). This figure fails to take into consideration the extent to which an original vessel might have been scattered across the site - so that several excavations conducted in different areas might recover multiple 'unique' vessels which are actually part of the same original object. That said, no such inter-trench links were found (or noticed) among the Sealinks material. A more important problem with this figure is that it makes the presumably mistaken assumption that every part of Unguja Ukuu was occupied as densely as the areas explored by the Sealinks Project. Unfortunately it is impossible to adjust these figures for site density as the data is not available. However, even if it is assumed that only 1 ha (a 100 x 100 m area) was occupied with the same average density as the areas excavated by the Sealinks Project, then a substantial quantity of glass, in this case 98,100 vessels, is still arrived at.

Obvious limitations aside, it might be worth unpacking such a figure for a moment. If it is assumed that Unguja Ukuu began to be heavily involved in maritime trade at some point during the 7th century and ceased to partake at some point during the 10th century, this would either give a 'long' chronology of 400 years or a 'short' chronology of 200 years. A figure of 98,500 vessels would require an average yearly import of 246 vessels according to the 'long' chronology, or 493 vessels by the 'short' chronology. Suddenly such a number doesn't seem so large, and indeed the initial figure of 1.67 million (though it remains staggeringly unlikely) would only require an import of between 4,186 and 8,372 vessels per year. Data from shipwrecks as to the size of cargo suggests these figures could be easily attained. Although no wreck sunk on its way down the East Africa coast is presently known, an example from Southeast Asia will suffice for the purposes of illustration. The Belitung wreck, an Arab dhow which sank in the Java Sea during the 9th century c. 835 AD while returning from China, was only 18 m long and 6.4 m wide yet carried some 70,000 pieces of Chinese pottery and 13 tonnes of lead ingots, with space for smaller numbers of objects made in precious metals (Stargardt 2014). As such, the quantity of vessels posited for Unguja Ukuu would be easily attainable over the period of its occupation.

Of course, the calculation of unique vessels more appropriately references breakage rates per year rather than imports, for which it is no more than a proxy. That said, the point remains the same - at least this number of vessels would need to have arrived at Unguja Ukuu to account for the breakage and no more, thus not including vessels which were exchanged onwards or did not make it into the archaeological record. It would of course be a mistake to assume an even quantity of imports year-on-year, with annual, or even longer term, fluctuations inevitable. Indeed, it is possible that the majority of the glass appeared at the site in a small number of large shipments. This point is further considered below, upon discussing the range and proportion of vessel types identified - with the predominance of a small number of particular types perhaps arguing that this was the case. Regardless, clearly the suggestion from Unguja Ukuu that huge quantities of glass were present is in keeping with the realms of possibility, and perhaps it is our ideas as to the size of the glass (and other material) trade in the Indian Ocean at the end of the 1st millennium AD that need to be revised.

5.2.7.3. The role of glass at Unguja Ukuu: practical and social functions

What was all this glass doing at Unguja Ukuu? The best insight into this undoubtedly comes out of an analysis of the range of forms and types of vessels present at the site, and particularly their relative proportions to one another. In turn, the best idea of form and type comes from rim fragments. Throughout the above sections, in which the data pertaining to each trench was presented, it has been seen how open vessel forms dominate the assemblage. In terms of fragment count, open forms make up 88.07% of the rim fragments (288 fr.), with just 8.87% of fragments (29 fr.) originating from closed vessels, and 3.06% (10 fr.) from semi-open forms (Fig. 5.47). That said, quantification according to weight provides a different impression, with open vessel forms making up just 56.97% (129.83 g.) of the assemblage, closed vessel forms 39.05% (89.01 g.) and semi-open forms 3.98% (9.07 g). Estimated surface area accounts are different again, with 76.48% open (36340 mm^2), 18.26% closed (8675 mm^2) and 5.2% (2500 mm^2) semi-open. Finally, estimates of unique vessels suggest 221 open vessels (86.67%), 28 closed vessels (10.98%) and 6 semi-open vessels (2.35%).

	Fr. Count %	**Weight %**	**Surface Area %**	**Vessels %**
Open	88.07	56.97	76.48	86.67
Closed	8.87	39.05	18.26	10.98
Semi-open	3.06	3.98	5.2	2.35

FIG. 5.47. PROPORTIONS OF RIM FORMS FOR UNGUJA UKUU

First, it is necessary to consider the significance of this methodological variation, particularly as the discrepancy between weight and the other methods will have big implications for how we view the assemblage. The question is which measurement offers a more accurate impression? Here, weight is possibly the measurement most misleading, in that the other measures are broadly in agreement with one another in terms of proportions. Weight, it is hypothesised, will over-represent heavier and less fragmentary forms such as the chunky necks and rims of closed vessels are want to be. As such, it seems reasonable to conclude that between 85-90% of the assemblage is made up of open vessel forms. Furthermore, this pattern is more or less the same in every trench - discounting trenches UU12 and UU13 due to the small numbers involved. Trench UU15 has the highest proportion of closed forms - which is interesting considering the observations made above regarding how it stands out as a sequence in terms of interpretation and quantity of glass overall. Indeed, the suggestion that the

UU15 glass assemblage can be slightly differentiated from the other trenches is a theme that is repeated below when the presence and absence of particular vessel types, as well as the range of colours in which they were created, are discussed

How can the function of glass at Unguja Ukuu be interpreted? Before looking more closely at the range of rim types, it is possible to say something based on the observation of the dominance of open forms. Such forms, which include shapes that might be termed ‘cups’, ’beakers’ or ‘bowls’, are closely associated with acts of consumption, whether serving, eating and indeed drinking, as well as apt items for display, whether placed on their base or mounted vertically. As such, open vessels tend to play both a visible and active role in material life, less likely to be stored away out of site and rarely seen, but instead displayed and used, even held, on a more regular basis. A closer look at the range of open vessel types will help to further these observations.

As seen in the sections above, the open vessels are mostly of a relatively plain form, with unelaborated simple rims - namely the *plain (rounded)* and *plain (fine)* types. Slightly more elaborate variations on the same profile are found in the *stepped*, *triangular-beaked* and *inwards-folded* rim. All of these vessels are not just similar in their slightly convex-sided profile, but of a similar range of diameters of around 80 mm and presumably of a depth of around 80 mm. That said, there is considerable range in size, with the *plain rims (rounded)* ranging in diameter from 50 mm to 120 mm! The range of diameters for each type suggests a tendency towards small diameter vessels - with smaller vessels perhaps hand held (some can not be set down) and used for drinking? The remainder of the open vessels consist of a small number of distinctive types which are represented in small numbers. Again there are no particularly elaborate forms, just a range of simple beaker and bowl shapes, with very few exceeding 100 mm in diameter. These are joined by three plate fragments (two identified by bases only).

It is important to note that the vast majority (94.5%) of the open vessel forms can be divided into just five types. This dominance thus belies a dramatic lack of variety in the assemblage, and requires some consideration. The main question is whether the limited variety of items relates to demand or supply. Demand-driven high levels of standardisation might indicate that only a limited range of plain and simple vessel types were affordable, but this doesn’t seem to fit with the large quantity of vessels at the site. If the inhabitants wanted more luxurious bowls, surely they could have chosen to foregoquantity in favour of quality? A more appropriate ‘demand’ based argument works on the basis that the glass-using inhabitants of Unguja Ukuu specifically sought this narrow range of vessel types, either because they were happy with the functional capacity they afforded, or perhaps due to the fact that they were socially valuable, the late 1st millennium ‘must-haves’. More unusual vessel types perhaps didn’t give off the right signals, or carry the right connotations. Supply-driven low variety works on the premise that this limited range of vessels was all that was on offer to the inhabitants. This might come about due to a long-term trade association with a particular place or places where these happen to be the types of vessels readily available. Another option is that this is what merchants chosen to fill their cargo with.

The smaller numbers of closed and semi-open vessel forms suggests that glass did not play an important role as a storage or container item at Unguja Ukuu, whether for bulk liquids or more precious commodities. As with the open forms, two types dominate the closed assemblage - a form of globular bottle with *folded and flattened rims* and smaller flasks with *ribbed necks (narrow)* - with only one or two examples of the other types. Generally speaking, *folded and flattened rims* are associated with globular bottles, a cheap and utilitarian form, while *ribbed necks* have been interpreted as belonging to smaller flasks employed as containers for toilet items, whether perfumes, cosmetics, medicines, or even for other precious commodities like spices (see chapter 3). The other types might also be divided among those which represent small containers (the *miniature jar,* the *flaring necks (bulging/rolled-in/widemouthed*) and those for storage and serving (the *flaring necks (straight)*. For the semi-open forms, such as the *vertical neck (wide)* vessels and those with *bevelled* rims, an even smaller quantity were recorded. Such vessel forms are more closely associated with serving practices (decanting and pouring), and not suitable for storage as they cannot easily be sealed.

Smaller containers, such as those evidenced by the vessels with *flaring necks (bulging)* and *ribbed necks (narrow)*, could be interpreted as evidence of a trade in perfumes, medicines, cosmetics *et cetera*. The fact that the numbers of such vessels make up just a tiny proportion of the Unguja Ukuu assemblage suggests that any such activity was small in quantity, and not overly important to the glass trade. One implication of this is that the demand for glass was for objects valued in their own right, not as mere containers for other commodities. Yet in this interpretative context, the presence of globular bottles with *folded and flattened rims* becomes harder to understand. These vessels have been described in chapter three as cheap, utilitarian items, full of imperfections, and designed to fulfil a wide variety of liquid storage functions. As such, they might be considered containers for transporting liquids for exchange, whether oils or wine, yet a number of factors argue against this. These mostly centre on their poor suitability for transport, in that they are bulky and not easily stacked, as well as being fragile. Surely transport of liquids in larger ceramic vessels would make more sense. Another option is that they moved around as ships' or merchants' possessions, though it is hard to prove any such claim. It has been noted above that one of the fragments has apparently been incised with a series of characters which look like 'Arabic' script, though have proved unintelligible. If this incision was deliberate and meaningful, it might indicate an attempt to establish personal ownership of a particular vessel, however even the basic premise here is a matter of debate.

Regarding the non-rim assemblage, it is hard to say anything about function based on an analysis of miscellaneous or base fragments. For bases, even size is a poor indicator of vessel form. The exceptions are the very smallest bases, *types 1* and *2*, which clearly belong to small vials or flasks of the type used for toiletries etc. These are not overly common however, with only seven examples of each, thus supporting the above estimation that such vessels were not an important part of the Unguja Ukuu assemblage. For the miscellaneous fragments, the *internal body folds* are difficult to interpret in terms of function. They probably were found in relation to open vessel forms, but there is no conclusive evidence of this. These folds are unlikely to have been purely decorative, serving some purpose, though what that may have been remains obscure. One scenario is that the folding added strength to the mid-part of the vessel, though surely this would just as likely weaken it? Alternatively, it may have allowed the vessel to be partially sealed or partitioned by allowing for something to rest on it. Another option is that it acted as a crude measuring line. The applied foot, found in trench UU14, clearly offers a functional role in providing a means of standing the vessel, though it is likely that this in itself was done to enhance the aesthetic appeal of the vessel.

To summarise this exploration of the functional role of glass at Unguja Ukuu, it has been suggested that glass was mostly employed in acts of consumption and display, with a particular focus on drinking and eating. Most of the open vessels were small enough to be held comfortably in hand, and indeed many wouldn't stand evenly on their own. The idea that glass was exploited for its social value, whether in the course of use or simply by display, should not be underestimated. Such a role may have seen the possession or use of glass, and the range of activities that it allowed, connote wealth, status and connections with a wider Indian Ocean and Islamic world. In doing so, glass helped to maintain the possessor's social position and, perhaps even more significantly, distinguish them from the inhabitants of the local regions where glass was not a part of material life. The dominance of one type of vessel (*plain rims (rounded)*) in particular is interesting, and possibly relates to a socially-defined 'must have' - or perhaps this all that was easily available - a staple. On the most part, it has been seen that the glass at Unguja Ukuu was not particularly elaborately worked but designed to be used. While there are a few rare pieces, these are very much the exception, and this observation, along with the quantity of vessels, seems to suggest glass was not the preserve of a material hoarding elite. Altogether, glass likely formed a visible and integral part of material life at Unguja Ukuu.

5.2.7.4. Understanding colour and decoration

In addition to the form of the vessels, the instructive value of the more aesthetic attributes mights be considered, namely decoration and colour. A total of 33 fragments possessed traces of decoration (21.8 g., 4620 mm^2), with these evidencing the use of six different techniques. *Trailed* decoration was most common (14 fr., 4.46 g., 1160 mm^2), followed by the *pinched* technique (13 fr., 4.45 g, 1525 mm^2). *Scratch-engraving* was more rare, present on just three fragments, while there was a single example *mosaic or millefiori* glass.

The first observation here is that decoration is not common at Unguja Ukuu. Only 0.91% of the total assemblage exhibits any decoration. Indeed, many of the examples of *trailed* and *pinched glass* may stem from just one vessel. The significance of this is a matter of debate. On the one hand, there is the argument that this was not a high value assemblage. Yet this might not be a useful way of thinking. What is more likely is that decoration is not generally common in regard to Early Islamic glass, a point already made in Chapter Three, Chapter Four and particularly in Chapter Six. This is in contrast to the current dogma, and the obsession with decoration which many glass specialists seem to exhibit. It is, of course, in contrast to the impression given if one were to consult the majority of literature written on the topic, in which decorated and elaborately worked pieces rank highly.

One consequence of this point is that the decorated vessels which are present would really have stood out in the Unguja Ukuu assemblage. Consideration of their context reveals that the *mosaic* glass was associated with the structural deposit in trench UU15, and thus it is reasonable to make a connection between this rare type and the structure in question. The other decorated fragments, however, all stem from midden deposits. Another point worth making is that decorated fragments appear to be most common in trench UU15 (Fig. 5.48), with 1.35 fr./m^3. That said, it is possible that the trailed fragments belong to the same (or a small number of) vessel. No decoration is present in UU12 and UU13, though this is not in itself significant due to the small numbers involved in each case. Similar amounts are presented in trenches UU10 and UU11 respectively, with 1.15 fr./m^3 and 1.18 fr./m^3. Interestingly, trench UU14 has the least by volume, with just 0.71 fr./m^3. That said, it also possesses the most diversity in terms of number of techniques, with five identified.

	Decorated fragments/m^3
UU10	1.15
UU11	1.18
UU12	0
UU13	0
UU14	0.71
UU15	1.35

FIG. 5.48. DENSITY OF DECORATED FRAGMENTS PER TRENCH

Altogether, the conclusion must be that decoration was not common at Unguja Ukuu. Either this is because it was not a huge concern for the inhabitants, that is, they did not demand it, or that it was not available to them, either due to its unaffordability, the selection of glass put on offer by the merchants, or indeed the fact that not much Early Islamic glass was decorated in any case. It is worth remembering that the Belitung wreck suggests merchants tended to balance their cargoes with a large quantity of lower value items and only very few more expensive items (Stargardt 2014). It is likely that this strategy played a part in determining what was on offer.

In terms of colour, the glass assemblage from Unguja Ukuu contains a total of 12 different colour groups, in addition to which there is COR and U. For those fragments for which it was possible to assess colour (Fig. 5.49), the most common group in terms of count was IB glass (37.79%), followed by LGB (30.23%), OG (15.14%), CL (11.75%), BL (2.46%), COR (1.35%), with less than 1% quantities of BK, BR, EG, TQ, MOSAIC, PK and RD. The other quantification methods present a slightly different picture. The less represented colour types retain more or less the same proportions. However, this is not true for the more common types. Weight suggests similar levels of

IB (34.58%) and LGB (33.63%) glass, while ESA suggests a bigger difference than fragment count with IB on 39.10% and LGB 29.43%. Both measures put CL into third place, pushing OG into fourth, though to different degrees, with weight suggesting CL (12.32%), OG 8.59%; and ESA putting CL on 13.33% and OG on 11.30%. Both measures also raise BL glass as a proportion of the total, with weight putting it at 5.35%, and ESA at 3.13%.

	Count %	**Weight %**	**Surface Area %**
IB	37.79	34.58	39.10
LGB	30.23	33.63	29.43
OG	15.14	8.59	11.30
CL	11.75	12.32	13.33
BL	2.46	5.35	3.13

FIG. 5.49. PROPORTION OF MAIN COLOUR GROUPS BY TRENCH

Looking at the differences between the various trenches (see sections above), UU10 and UU11 present similar proportions of the main groups. Trench UU14 possesses a particularly large quantity of IB glass. The most interesting trench is, yet again, UU15, which has a particularly low proportion of IB glass but a high quantity of OG (at least in terms of count and ESA, though not necessarily weight). This continues to confirm the idea that the UU15 sequence represents something different, and indeed the low proportion of IB is probably linked to low quantity of *plain rims (rounded)*. Among the observations to be made here, it is worth noting first of all that although there is a considerable variability in large number of metal types, the vast majority of fragments are confined to just four or five naturally-coloured types, with the other brighter and deliberately coloured metals represented by just a handful of fragments in each case.

The significance of this may be that just a limited selection of colour groups were available, or there was limited demand for more brightly coloured glass. The inhabitants may have favoured plain basic colours, or been content with them, as these are not unappealing in themselves - especially considering glass is already an exotic material. Indeed, the dominance of plain colours matches the relatively plain range of types and lack of decorated glass. A related point worth reiterating is that very few of the fragments were deliberately coloured. All the main types are naturally coloured, even CL, though some of these fragments may reveal an element of de-colouration, though compositional analysis would be needed to confirm this. The BL and TQ colours were probably achieved by addition of copper. Even rarer and more enigmatic are the handful of black, red and pink fragments.

The low number of deliberately coloured glass fits neatly with the low quantity of decorated fragments, giving an understated aesthetic to the assemblage. Again the possibility that coloured glass was not as common as people like to think must be considered, with the vast majority of fragments naturally coloured. Another supportable conclusion is that the glass assemblage was not high value at source, owing to the absence of coloured and decorated vessels, though this does not mean it was not considered high value at Unguja Ukuu. Again, this all goes to show that the uniquely coloured pieces - blues, mosaic, red *etc* would really have stood out alongside the decorated vessels.

5.2.7.5. Overview of the main results

Regarding the results of the Sealinks excavations, the conclusion must be that trenches UU10, UU11 and UU14 have explored areas slightly away from the direct occupation areas of Unguja Ukuu, or at least areas where the occupation (and thus stratigraphy) was regularly destroyed by tidal action. These areas could have been used for trading activity along the foreshore, but also appear to have been used for dumping of refuse. The trampled floors of UU14 are the most substantial features, and while they certainly can be considered ‘activity areas’, they cannot be associated with any specific type of activity, just as it would be a stretch to consider them evidence of habitation. Meanwhile, UU13 and UU15 appear to have investigated areas of more substantial settlement, as indicated by presence of the timber building in UU15. These areas were undoubtedly much more stable, avoiding the problems of marine transgression which affected UU10, UU11 and UU14. Furthermore, they also seem to evidence a slightly longer occupation than seen in the other trenches (the much later burial from UU14 excluded), with evidence for activity in the 11th century AD. Whether this represents a formal continuation of the site or a more sporadic squatter occupation is a question that remains unanswered.

Regarding the glass assemblage, the first point is that glass was undoubtedly incredibly numerous at Unguja Ukuu, with a conservative estimate of 255 unique vessels recorded in excavations which covered just 26 m^2. This has staggering implications for quantity when one considers than the entire site has been estimated at a size of 17 ha. Even if just 1 ha of the site was occupied with the same average density as the strata explored by the Sealinks excavations, this would amount to almost

100,000 vessels. A second point is that such a high figure would not in itself put a strain on the Indian Ocean trade networks. As the Belitung wreck shows, dhows engaged in long-distance journeys carried tens of thousands of objects. Furthermore, the duration of occupation at Unguja Ukuu would only require 200 - 400 vessels per year to meet a figure of 100,000.

On the role of glass at the site, so far as can be seen from the forms present, glass seems to have been employed, primarily, for the purposes of consumption and display. Although we do not have the data to be certain, it seems likely that this use was quotidian rather than ritualistic or elite (within the context of the site at least). The assemblage was dominated by a range of relatively small open forms, perhaps best termed ‘beakers’ rather than ‘bowls’, and which could easily have been hand held. There seems to have been little role for closed vessels, suggesting they were not an important part of any glass trade. Furthermore, there is little evidence for a trade in precious commodities of the sort that would have been stored in glass. Indeed, of all possessions at the site, globular bottles with folded and flattened rims represent the best candidates for merchants possessions - with a crude possible inscription perhaps an attempt at signifying ownership.

A big question is how much of the glass trade was destined for use at Unguja Ukuu, and how much for onward trade. It is possible that some of the midden deposits were filled with material which broke in transit. Indeed the midden deposits seem distinct from the type of assemblage found in UU15, the one clear structural feature. That said, there is no reason why the merchant ships themselves couldn’t have carried out much of this wider distribution. Furthermore, there is clearly no distribution of imported glass to the East African interior, one of Unguja Ukuu's main trading partners.

Regarding the appearance of the glass, in aesthetic terms, it has been demonstrated that brightly coloured glass and decoration are rare. Either such items were not in demand, not available, or not within the affordability of the community generally. More to the point, one outcome of this observation is to support the idea that decoration of glass in the Early Islamic period was rare, and was not common in the majority of assemblages. At Unguja Ukuu, less than 1% exhibits any decoration. This contrasts with the impression from glass study sources, particularly museum publications, as shall be discussed in Chapter Six.

The typological analysis of the glass (Chapter Three) suggests that the closest links were between Unguja Ukuu and the Persian Gulf, particularly the site of Siraf. As will be suggested in Chapter Six, merchant vessels based there likely made seasonal trips to Unguja Ukuu and other localities on the East African coast loaded with a careful balance of a majority of a basic range of material commodities and few luxury items. The glass itself dates to the 7th-9th century, with an emphasis on the later part of this period, suggesting that much, if not most, arrived during the second half of the 8th to the 9th century AD at the rate of several hundred vessels per year. Indeed, the fairly standard range of vessels would suggest arrival of larger numbers in a short period, rather than a protracted series of imports over a 400 year period. The suggestion that parts of the sequence appear to have been disturbed, along with the fact that the various types are distributed throughout the different phases of the sequence, means that the Unguja Ukuu sequence cannot in itself be used to refine the chronology of the typology presented in Chapter Three beyond the precision of a general 7th to 9th century date.

5.3. Chapter Summary

Chapter Five aimed to present and analyse the glass assemblage from the Zanzibari site of Unguja Ukuu. The chapter first presented the glass from the individual trenches, before concluding with an interpretation of the significance of the findings as one. Having adopted the same typological framework and methodology as was used in regard to the Kuwaiti glass, Chapter Six will next compare the results from the two sites against one another, as well as a small number of other sites where suitable data exists. The main outcome from Chapter Five is that glass was present at Unguja Ukuu in enormous quantities. Furthermore, the assemblage in question was very much concentrated on open vessel forms which might be traditionally described as tablewares used in acts of eating and drinking. The interpretation given above, and explored in greater detail in the following chapter, is that glass was employed at Unguja Ukuu as much for its social value as its practical use. The previous three chapters have presented and analysed the original data produced by this thesis. In the penultimate chapter, Chapter Six, the thesis proceeds with a discussion of the results of this research according to the three main aims and questions raised in Chapters One and Two.